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Northern Affairs Program



Echo Bay's new Lupin gold mine near Contwoyto Lake. This mine is the newest mine in the Northwest Territories. Photo courtesy of Echo Bay Mines Limited.

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Introduction

This report covers mines and mineral activities north of 60° for the calendar year 1982.

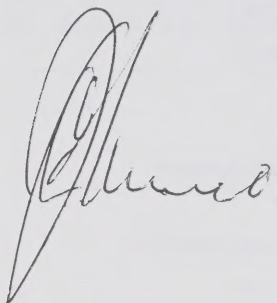
This report was written and edited by T.W. Caine and D.D. Brown. The section on economic and policy analysis was prepared by the Mineral Policy Division under the direction of J.W. Fraser. Sections on mineral exploration were based on papers prepared by J.A. Morin, K.J. Grapes and R.L. Debicki on the Yukon and by W.A. Padgham, W.A. Gibbins, P.J. Laporte, C.C. Lord and J.B. Seaton on the Northwest Territories.

It is with great pleasure that I present a revised edition of *Mines and Mineral Activities*. This year, the publication has a new format, which provides a more comprehensive picture of mineral activity north of 60°. This has been achieved through the addition of an economic and policy analysis section to complement the wealth of technical and statistical material which has always been a feature of the report.

These changes are designed to better reflect the importance of the mining sector to the regional economy and its interrelationship with the Canadian economy as a whole. The unusually severe economic recession which characterized 1982 has only served to underline the contribution of mining to both the Yukon and Northwest Territories. The industry has been and will continue to be a driving force behind northern economic development. Its role can only be reinforced as the global economy improves and metal markets recover.

The Department of Indian Affairs and Northern Development has also undergone a reorganization to reflect this high profile. I recently established a Mining Management and Infrastructure Directorate within the Northern Affairs Program which pools sectoral expertise. The Directorate is responsible for the formulation of policies, legislation and regulations to promote the orderly management of mineral resources; the assessment of mineral projects; and on-going administrative functions. The inclusion of infrastructure serves to recognize the linkage between mining and the development of transportation and communications services.

I hope that this new edition of *Mines and Mineral Activities* will provide readers with a more complete view of the northern mineral industry's activities during the year under review. This is all the more important since my Department has begun work on a northern mineral policy designed to provide a framework for the future development of this sector. The successful development and implementation of such a policy will depend to a large extent on the dialogue between those affected by such a policy and those tasked with its formulation. If this report serves to better inform you the reader, then one step in such a consultative process will have been fulfilled.

A handwritten signature in dark ink, appearing to read 'J. Munro', with a large, stylized initial 'J'.

John C. Munro

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Executive Summary

The mining industry is the principal non-governmental activity in both the Yukon and Northwest Territories. During 1982 and early 1983, the mining sector in both Territories felt the impacts of the world economic recession. Low metal prices, coupled in some cases with high inventory and low demand, resulted in mine shut-downs, production cutbacks and indefinite layoffs. In the Yukon in particular, the repercussions of the shut-down of all mining operations was felt throughout every sector.

Northwest Territories

Overall mineral production from the ten mining establishments in the Northwest Territories rose during 1982 to \$569 million which represents an increase of 43 percent over the 1981 current dollar value. The value of mineral production and quantities of lead, zinc and gold mined increased significantly because three new mines were in their first full year of production during 1982. These were Echo Bay's Lupin gold mine, the Cullaton Lake gold mine and Cominco's Polaris lead-zinc mine. In addition, Canada Tungsten's Cantung Mine produced tungsten concentrate for the full year, following an extended strike in 1981. Terra Mines Ltd's Camsell River mine also resumed production in mid-year of its silver concentrate.

By year-end, it was evident that the mining industry of the Northwest Territories, the largest private sector contributor to the territorial economy, was suffering from the severe effects of world-wide recession and in particular from low base metal and tungsten prices.

In the Northwest Territories, heavy operating losses resulted in the closure on January 2, 1983 of the Territories' largest mine, the Pine Point lead-zinc mine, controlled by Cominco Ltd. In addition, Canada Tungsten Mining Corporation's Cantung tungsten mine, controlled by Amax Inc., closed on January 21, 1983 because of low tungsten prices and high concentrate inventories. With the expectation of metal price improvements in 1983, production at the two mines is expected to resume.

In 1982, exploration expenditures in the Northwest Territories declined to approximately \$22 million from \$50 million in 1981.

Yukon Territory

In the Yukon Territory, the permanent closure of Whitehorse Copper Mines due to depletion of its ore reserves and the indefinite closure of Cyprus Anvil's Faro and Tantalus Butte mines and United Keno Hill Mine's Elsa operations, introduced an economic climate where, for the first time in decades, there were no year-round operating mines in the Territory. These adverse developments were beyond immediate remedy given the general economic recession and poor world metal markets.

Due to mine shut-downs and closures, the current dollar value of mineral production in the Yukon Territory fell to \$168 million. This represented a decline of 37 percent from the 1981 figure of \$268 million. The number of Yukon placer gold operations also declined because of low gold prices during the first half of 1982.

Prospects for lode mining in 1983 hinge largely on the resumption of full-scale operation by Cyprus Anvil Mining Corporation of its lead-zinc mine near Faro. The Anvil mine is the largest private sector employer in the Territory and the effects of its closure on June 4, 1982 have been felt throughout the Yukon economy. Since this time, the Department of Indian Affairs and Northern Development and Cyprus Anvil have been co-operating in the development of a number of action plan proposals to get the Faro Mine back into production. Full-scale re-opening, though, awaits an improvement in lead and zinc prices.

United Keno Hill Mines silver-lead mine shut down in mid-July 1982 due to large operating losses and low silver prices. An improvement and stabilization in silver prices is necessary if the mine is to remain open.

Due to high interest rates and the generally poor economic climate, mineral exploration expenditures in the Yukon declined to approximately \$22 million from \$50 million in 1981.

Future Developments

The outlook for resumption of growth in the northern mineral industry is dependent on general economic recovery. In 1983, decisions will be made on whether to re-open the Cyprus Anvil, United Keno Hill, Pine Point and Canada Tungsten mine operations. If gold price increases are realized, new gold mining operations are likely to appear. The most promising are Giant Yellowknife's Salmita gold project, northeast of Yellowknife and Cominco's Ptarmigan gold property, near Yellowknife. In the medium term, Amax of Canada Ltd. has announced that its \$171 million Mactung tungsten project, on the Northwest Territories-Yukon border, is slated to commence production in 1986-87. The Mactung deposit is the largest tungsten deposit in the western world with 57 million t averaging 0.95 per cent WO_3 (tungsten trioxide). At capacity production, the Mactung and Cantung mines will each produce approximately 3.2 million kg of tungsten contained in concentrate per year. At this level of output, Canada will be the largest producer of tungsten in the western world.

Economic and policy analysis

Introduction

The northern mineral industry, through its wide-ranging direct and indirect impacts, provides the basis for the major share of the economic activity in the Yukon and Northwest Territories. Economic impacts are not restricted to the territorial economies, however, since important linkages have been established with some provincial economies. In addition, the industry makes a significant contribution to Canada's external trade in minerals.

Starting with this issue, *Mines and Mineral Activities* will present an annual analysis of the economic impact of the industry at both the national and regional level. Relevant policy developments will also be reviewed. The addition of this economic and policy dimension to complement the technical and statistical data in the report will provide a more comprehensive appreciation of mineral related developments, as well as an insight into the future course of the industry. A brief summary from 1976 to 1980¹ of regional and national impacts has been included to provide a framework against which to compare current and future developments within the industry.

The Northern Mineral Industry in the Canadian Economy: 1976-1980

The Yukon and Northwest Territories encompass about 40 percent of Canada's total land mass but are inhabited by less than one half of one percent of its population. Both Territories are richly endowed with resources but their mineral potential has only begun to be developed.

¹Due to data gaps for 1981, only the period 1976 to 1980 has been included.

Nevertheless, the mining industry in the Territories accounted for an important share of total Canadian production of lead, zinc, silver and gold. Over the period 1976 to 1980, these shares amounted to 43, 27, 18 and 15 percent respectively. In addition, during the same period, all of Canada's tungsten production came from north of 60°. In total, the industry accounted for about 6 percent of the national value of non-fuel mineral output in 1980.

Significant changes, though, have occurred in the last two years. By 1982, lead production had fallen to 40 percent of Canada's total production while zinc had steadily risen to 33 percent. Although silver still maintained its relative market share in 1981, it fell dramatically to 6 percent of Canada's total in 1982 due to the mine shut-downs and closures in the Yukon during the second half of the year.

The industry is also making an important contribution to the Canadian balance of payments since more than 77 percent of the revenue generated by northern mining is through export sales. Over the period 1976 to 1980, export sales from northern production had an annual average value of \$141 million. By 1980, this figure had reached \$338 million.

In addition to this contribution, more than 96 percent of the purchases made by the industry (excluding salaries, wages and benefits) were made in Canada over the period 1976 to 1980. In 1980 alone, these purchases totalled about \$375 million. The manufacturing, transportation and trade sectors in Quebec, Ontario, Alberta and British Columbia were the major beneficiaries of these purchases.

The northern mineral industry plays a key role in the overall Canadian economy. It makes important contributions to total mineral production and sales in the world market. With a mineral potential that is not fully known but which is expected to be more fully developed over the coming years, this role can only be expected to expand.

The Northern Mineral Industry in the Northern Economy: 1976-1980

Mining is one of the most important economic activities in the Territories. An appreciation of its importance can be gained by an examination of selected socio-economic indicators which illustrate the varied and widespread impacts of the industry on the Territorial economies.

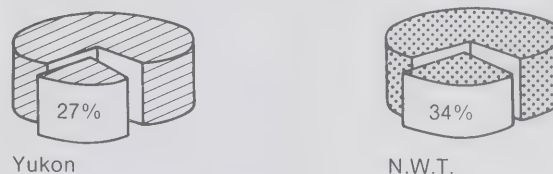
One indicator is the contribution of mining to Gross Domestic Product (GDP) which measures the value of all goods and services generated within the Territories within a given year. During the period 1976 to 1980, mining and oil and gas operations in the Yukon and NWT contributed 27 and 34 percent respectively of GDP. Separate estimates made in 1980 of mining alone, showed its contribution to be 29 and 36 percent respectively.

Direct and indirect employment generated by the mining industries in both Territories gives another indication of the importance of mining. Over the period 1976 to 1980, the industry directly employed 16 percent of the total labour force. In addition, it was estimated that indirect effects on the Territorial economy were such that each person-year of employment created by the mining industry generated three quarters of a person-year of employment in other key sectors. Indirect employment, therefore, accounted for another 12 percent of total employment. In total, the industry is responsible for the employment of 28 percent of the total labour force in both Territories, which amounted to some 5,400 people in 1980.

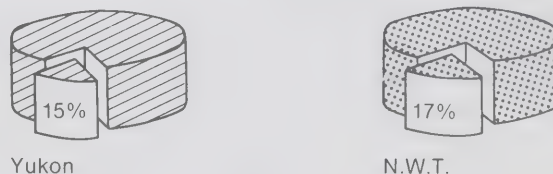
In addition, average earnings provided by the northern mining industry have been high. During 1976 to 1980, average annual earnings per employee, including special benefits, were around \$29,000. By comparison, over the same period, average annual earnings in the Canadian mining sector were \$25,000 and \$16,000 in Canadian industry as a whole. In 1980, average earnings in the northern mineral industry rose to \$35,000 which was 17 percent higher than in the mineral industry as a whole and 94 percent higher than average earnings in Canadian industry. This represented a total earnings package of \$189 million for the two Territories.

Figure 1
Relative Importance of the mining industry to the Yukon and Northwest Territories (1976-1980)

Gross Domestic Product



Employment

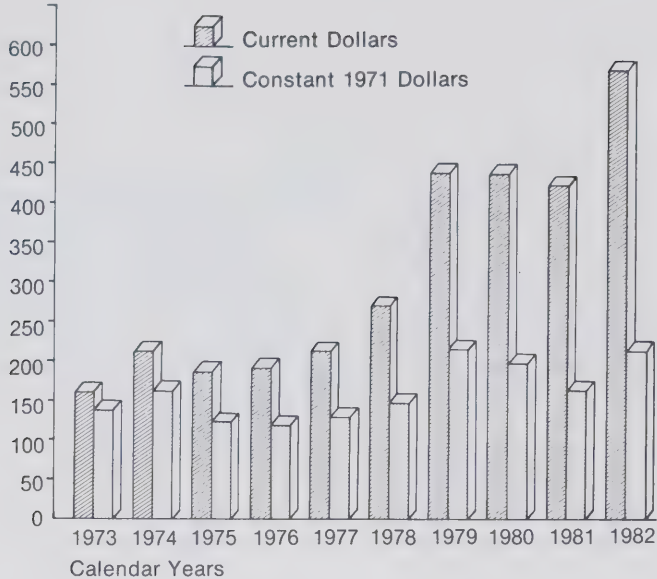


In keeping with its substantial contribution to overall economic activities in the Yukon and the NWT, the mining industry is a major source of direct capital expenditure. Total investment in plant and equipment over the period 1976 to 1980 has averaged \$67 million per annum. In 1980, machinery and equipment peaked at a total expenditure of \$131 million — an increase of some 96 percent over the average — due to the construction of the Prairie Creek, Lupin, Cullaton Lake and Polaris mines. Plant construction expenditures, including surface construction and underground work, have also grown considerably from a five year average of \$21 million to \$33 million in 1980.

Figure 2
Northwest Territories

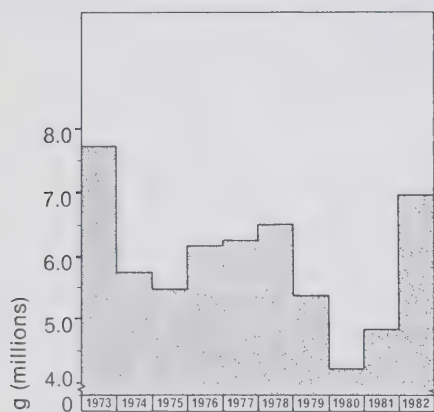
Value of Production

Millions \$

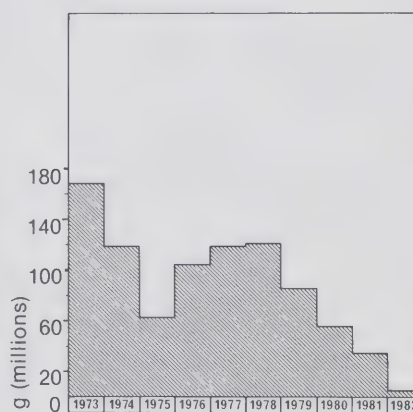


Mineral Production

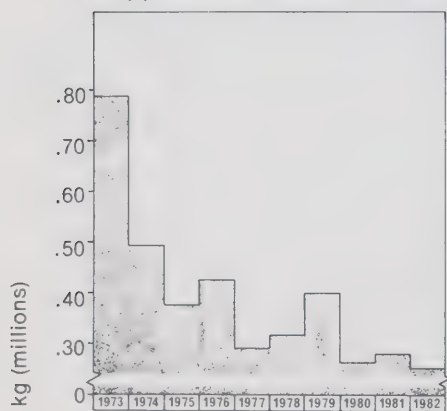
Gold



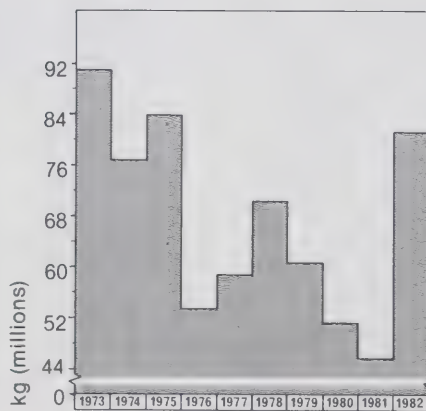
Silver



Copper



Lead



Zinc

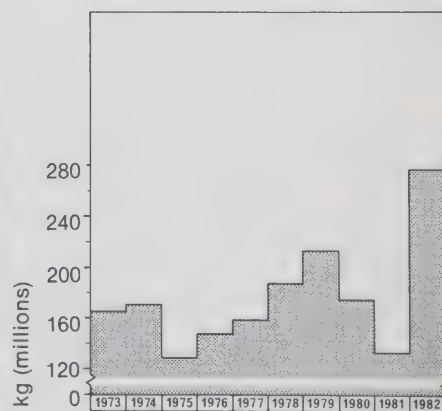
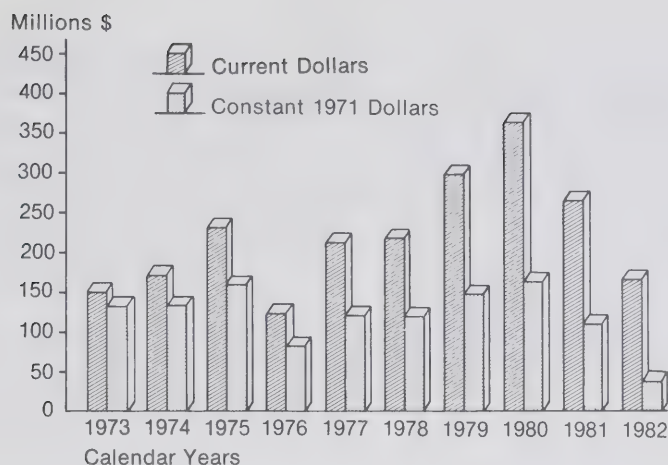
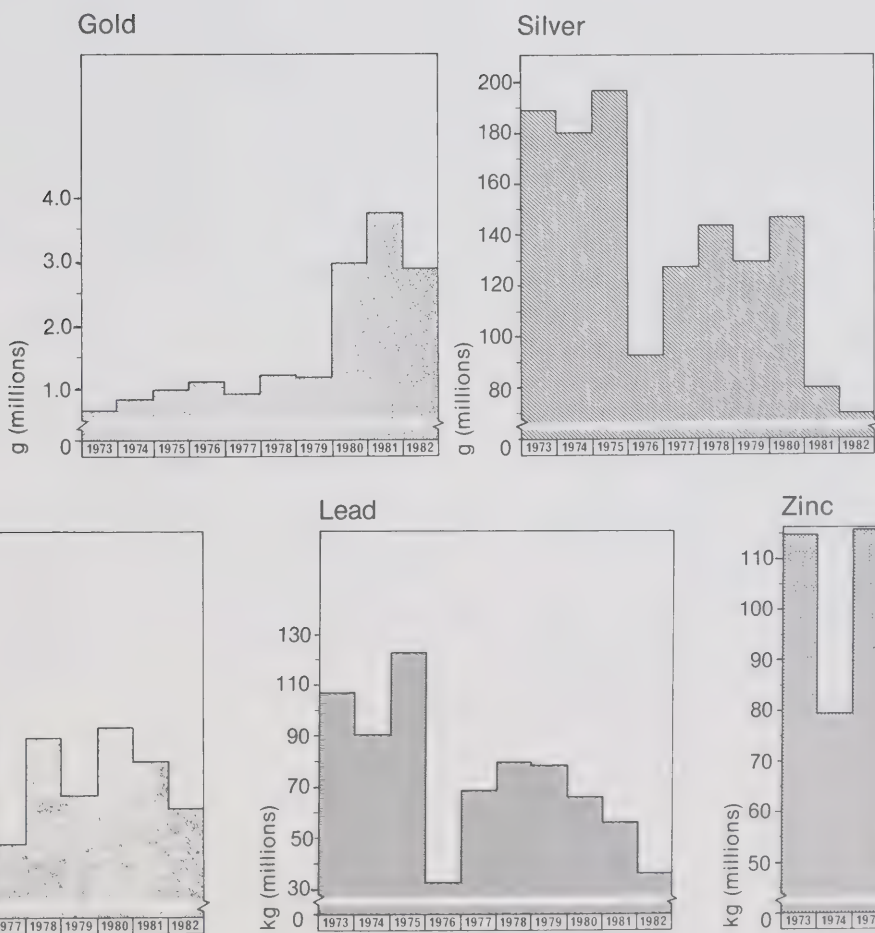


Figure 3
Yukon Territory

Value of Production



Mineral Production



Exploration and development expenditures were high reflecting confidence in the future growth of the mineral industry. Over the five years from 1976-80, they averaged \$57 million but by 1980 had reached a figure of \$75 million.

A final indicator is the portion of overall government revenue generated by the mining industry in both Territories. Over the period 1976 to 1980, \$57 million in taxes was paid at the federal, territorial and municipal level. In 1980, this reached a total of \$83 million.

Although it cannot be quantified, the mining industry has aided the development of infrastructure related to power, transportation and townsite construction which has helped to expand the economic scope and potential of the North. It has also provided varied job opportunities for Northerners.

Obviously mining has acted as a leading engine of growth in the Yukon and NWT. Due to the major role it plays in both economies, the mining industry is expected to continue to provide a strong and vital base for future Territorial growth and development.

Overview of the Canadian Mineral Industry: 1982

The year 1982 was marked by the worst world economic recession since the 1929 depression. The recession was characterized by a sharp reduction in the overall world demand for goods and services resulting in lower levels of industrial activities. This, in turn, resulted in a drastic reduction in the derived demand for metals and caused metal prices to plummet. The Canadian mineral industry, which is largely export-oriented, was severely affected. Poor metal markets, combined with exceptionally high interest rates during the period, caused many mining companies in Canada to end the year in a loss position. Many were forced to close their operations either temporarily or permanently and massive layoffs were made throughout the year by the industry in Canada.

The Northern Mineral Industry in the Northern Economy: 1982

The northern mining industry was not protected against the drop in world demand and metal prices. Mines in both Territories suffered revenue losses and some closed their operations pending an improvement in market conditions.

The Yukon mining industry was affected more severely than that of the NWT. Over the past decade the constant dollar value of mineral production in Yukon had remained relatively stable but in 1982, it plunged to a record low of \$62 million. This was a direct result of the closure of all major mining operations within the Yukon by year-end. Cyprus Anvil and United Keno Hill were shut down indefinitely as a result of world economic conditions and Whitehorse Copper closed permanently due to depletion of its ore reserves. These mine closures resulted in the direct loss of 1 200 jobs. Due to the close integration and interdependence of the mineral sector with other sectors of the economy, the impacts of the mine closures were felt throughout the economy. The White Pass and Yukon Railway and its associated trucking system as well as a number of small businesses in the service sector were closed.

The impact on the larger NWT mining industry, which places a greater emphasis on precious metals than the Yukon, has not been as severe. In fact, the constant dollar value of mineral production rose 30 percent to \$209 million surpassing the previous record set in 1979. This was due to the opening of three new mines: one base metal mine (Polaris) and two gold mines (Cullaton Lake and Lupin) in 1981 and 1982. In contrast to the Yukon, only two mines out of ten announced an indefinite closure by the end of 1982: Pine Point Mines Ltd., and Canada Tungsten Mining Corporation Ltd.. These closures directly affected about 800 workers but there were few other staff reductions at other mines in the NWT.

The Global Outlook

The outlook for the world economy in 1983 is somewhat brighter with most analysts predicting a slight recovery in the third and fourth quarters. Metal markets appear to be getting in balance and 1983 should see further price stabilization which may pave the way for some price increases. The severity of the recession has brought about some structural changes in the world economy which could affect the long term growth rate in the demand for some base metals such as lead and zinc. These changes, combined with the increased competition from developing countries, are important signs to the industry to stay vigilant by increasing efficiency and productivity in existing operations. Action is now under way within the industry to meet these challenges with cost cutting measures being implemented by most companies. Within this new economic environment, two criteria should guide the search for and development of new mineral deposits throughout Canada: low operating costs and high ore grades. Higher operating margins than before are necessary if new mines are to survive in this environment of increased competition and more widely fluctuating metal markets.

The Northern Mineral Outlook

As the global economy improves and metal markets begin to stabilize, the northern mineral industry will begin to recover from the reverses it had in 1982. Mines in both Territories will reopen as prices increase to levels which justify resumption of their operation. In the NWT, production is expected to return to the high levels of recent years but in the Yukon, structural changes may postpone this recovery for some time.

For the longer term, the Department of Indian Affairs and Northern Development (DIAND) is working on a northern mineral policy to guide future mineral development in the Territories. Although only the preliminary phases of policy development have been completed, the Minister of DIAND has already stated that he would like it to address such issues as the role of mining in the northern economy and the creation of a favourable investment climate through the maintenance of an appropriate fiscal and regulatory regime and the development of infrastructure. It should also take into consideration the role of native people and environmental concerns in order to establish an appropriate balance between resource development, people and the environment.

Mines and Mineral Activities



At the Con Mine, broken ore is hauled by modern rubber-tired scooptrams. Photo courtesy of Cominco Limited.

Introduction

The following sections of this report deal with mining production and development and mineral exploration activities in the North during 1982.

Mineral Production and Development

Mineral production in the Northwest Territories during the calendar year 1982 was valued at \$569 million compared to \$397 million in 1981 (see Table 8). Despite severely depressed world metal markets the value of mineral production increased 43 percent from 1981. Production of lead, zinc and gold increased because three new mines were in their first year of production. These are Echo Bay's Lupin Mine, the Cullaton Lake Gold Mine and Cominco's Polaris Mine. In addition, Canada Tungsten Mining Corp. produced tungsten concentrate for the full year, following a strike in 1981. Terra Mines Ltd.'s Camsell River mill resumed silver concentrate production in mid-year.

However, at year-end it was evident that the mineral resource industry of the Northwest Territories, the largest private sector contributor to the territorial economy, was suffering from the severe effects of worldwide recession, particularly the low base metal and tungsten prices. The largest mine in the NWT, Pine Point Mines Ltd., closed on January 2, 1983 and the tungsten operations of Canada Tungsten Mining Corporation closed on January 21, 1983. Production at both mines is expected to resume when metal prices recover.

Mines

Mineral production came from ten mining establishments: Canada Tungsten's Cantung Mine (tungsten), Cominco's Con Mine (gold), Cominco's Polaris Mine (lead, zinc), the Cullaton Lake Gold Mine (gold), Echo Bay's Eldorado Mine (silver, copper), Echo Bay's Lupin Mine (gold), the Giant Yellowknife Mine (gold), the Nanisivik Mine (lead, zinc, silver), the Pine Point Mine (lead, zinc) and Terra's Camsell River mines (silver, copper).

The Northwest Territories accounted for 28.0 percent of the lead, 26.9 percent of the zinc, 96.6 percent of the tungsten, 11.1 percent of the gold, 0.33 percent of the silver and 0.04 percent of the copper produced in Canada in 1982. The Northwest Territories accounted for 7.9 percent of the value of Canadian metallic mineral production.

The operating mines employed an average of 2 440 persons. By the end of January, 1983, 765 employees had been laid off through the closing of Pine Point's and Canada Tungsten's mines.

Table 1
Estimated Mineral Production
Northwest Territories, 1981-1982

Company and Commodity Mined	1982		1981	
	t	kg	t	kg
<i>Canada Tungsten Mining Corp.</i> tungsten trioxide	2948		2515	
<i>Cominco Ltd.</i> Con Mine gold silver		2466 603		2330 465
<i>Polaris Mine</i> zinc lead	64 773 25 310		— —	
<i>Cullaton Lake Gold Mines Ltd.</i> gold silver		788 373		11.56 0.14
<i>Echo Bay Mines Ltd.</i> Eldorado Mine copper silver	241	178	317	349
Lupin Mine gold		34		—
<i>Giant Yellowknife Mines Ltd.</i> gold silver		2258 452		1825 290
<i>Nanisivik Mines Ltd.</i> lead zinc	13 947 70 938		11 056 67 976	
<i>Pine Point Mines Ltd.</i> lead zinc	69 037 8 981		60 515 32 296	
<i>Terra Mines Ltd.</i> copper silver	9.5	26 717	—	1773

Source - Department of Indian Affairs and Northern Development and Department of Energy, Mines and Resources.

Canada Tungsten Mining Corporation

Canada Tungsten Mining Corp.'s Cantung Mine produced 2 948 t of WO₃ contained in concentrate compared to 2 515 t in 1981. On November 21, 36 employees of the then current work force of 240 were laid off. On January 21, 1983 the mine closed because of the weak demand and a precipitous decline in tungsten prices. An additional 174 employees were laid off. The company was monitoring the situation on a week by week basis with the expectation of resuming operations during 1983 when tungsten prices and market demand improve.

Type:	Underground
Location:	Tungsten
Product:	Tungsten in scheelite concentrate
Mill Rate:	915 t per day
Tonnes Milled:	327 494
Reserves:	2 760 000 t (Dec. 31, 1982)
Reserve Grade:	1.32% tungsten trioxide (WO ₃)
Employees:	246

Cominco Limited - Con Mine

Cominco Ltd.'s Con Mine appears to be in the strongest gold producing position in the Northwest Territories. The tonnage milled increased from 176 000 t in 1981 to 210 000 t in 1982. The company may make a decision in 1983 to commence production at its small Ptarmigan gold deposit near Yellowknife. In November, the company started operation of its \$13 million plant at Yellowknife to recover arsenic trioxide from arsenic wastes produced prior to 1970. This plant is expected to process 30 000 t of arsenic wastes over a five year period.

Type:	Underground
Location:	1.4 km south of Yellowknife
Product:	Gold, silver, arsenic
Mill Rate:	568 t per day
Tonnes Milled:	212 573
Reserves:	1 900 000 t (Dec. 31, 1982)
Reserve Grade:	16.1 g gold per t
Employees:	309



Cominco's Con gold mine at Yellowknife is a landmark in the Northwest Territories. Photo courtesy of Cominco Limited.

Cominco Limited – Polaris Mine

Cominco's Polaris Mine began commercial production in March, 1982 and concentrate shipments began in July. By the end of the shipping season in early October, bulk carrier ships had transported 117 000 t of zinc concentrates and 30 600 t of lead concentrates in six voyages to European markets. The company has indicated it may expand its operation to include mining of other deposits in the area if future lead and zinc markets improve.

Type:	Underground
Location:	100 km northwest of Resolute
Product:	Zinc, lead
Mill Rate:	1 284 t per day
Tonnes Milled:	469 700
Reserves:	21 954 000 t (Dec. 31, 1982)
Reserve Grade:	3.96% lead and 13.4% zinc
Employees:	222

Cullaton Lake Gold Mines Limited

Cullaton Lake Gold Mines Ltd.'s new mine, 370 km southwest of Rankin Inlet, reached commercial production on January 1, 1983, at the design mill rate of 272 t per day. During 1982 the company resolved its break-in problems and improved its mill recovery rate. An exploration program is in progress to define additional ore reserves. The mill may be expanded to 454 t per day and plans are under way to increase both mine development and exploration of adjacent gold anomalies surrounding the mine.

Type:	Underground
Location:	Cullaton Lake area, Keewatin District
Product:	Gold, silver
Mill Rate:	203 t per day
Tonnes Milled:	66 123
Reserves:	181 437 t (Jan., 1983)
Reserve Grade:	17.1 g gold per t
Employees:	138

Echo Bay Mines Limited – Eldorado Mine

Echo Bay Mines Ltd. closed its mill on the Eldorado silver property at Port Radium in March, 1982 and personnel were transferred to Echo Bay's Lupin gold mine on Contwoyto Lake, 330 km east of Port Radium. The ore reserves at the Eldorado Mine were exhausted in December, 1981 but sufficient ore was stockpiled to allow the mill to continue until March, 1982.

Type:	Underground
Location:	Port Radium
Product:	Silver, copper
Mill Rate:	89 t per day
Tonnes Milled:	7 511
Reserves:	Nil (Dec. 31, 1981)
Employees:	47



Pouring a gold brick at the Lupin Mine. Photo courtesy of Echo Bay Mines Limited.

Echo Bay Mines Limited – Lupin Mine

Echo Bay Mines Ltd. poured its first gold bullion at the Lupin Mine, near Contwoyto Lake on May 4, 1982. Commercial production was achieved in October. The company commissioned a new production shaft to replace the decline adit which had been used to transport equipment, waste rock and ore. Underground drilling indicated that the ore body continues below the 650 foot level to the 1 210 foot level.

Type:	Underground
Location:	400 km northeast of Yellowknife
Product:	Gold
Mill Rate:	721 t per day
Tonnes Milled:	178 000 (approximate)
Reserves:	3 565 690 t (Dec. 31, 1982)
Reserve Grade:	13.5 g gold per t
Employees:	227

Giant Yellowknife Mines Limited

Giant Yellowknife Mines Ltd. marginally increased the amount of ore milled in 1982 but announced in October that production would be reduced in the first quarter of 1983 to 22 680 t per month from 29 938 t in order to extend the mine life to 1987. The company produced 1 800 t of arsenic trioxide in 1982 for commercial sale as an ingredient in wood preservatives.

Type:	Underground and open-pit
Location:	2.4 km north of Yellowknife
Product:	Gold, silver, arsenic
Mill Rate:	1 003 t per day
Tonnes Milled:	366 122
Reserves:	889 041 t (Dec. 31, 1982)
Reserve Grade:	8.23 g gold per t
Employees:	343

Nanisivik Mines Limited

Nanisivik Mines Ltd. milled approximately 630 000 t in 1982, the same tonnage of ore as during 1981 but the zinc content of ore processed was higher in 1982. Improved mill recovery and increased smelter payment for silver content did not offset the lower prices received for lead and zinc. The company is continuing its exploration program aimed at discovering additional ore reserves within trucking distance of the mill.

Type:	Underground
Location:	29 km northeast of Arctic Bay, Baffin Island
Product:	Zinc, lead, silver, cadmium
Mill Rate:	1 777 t per day
Tonnes Milled:	633 628
Reserves:	4 539 300 t (Dec. 31, 1981)
Reserve Grade:	4.3% lead, 6.6% zinc
Employees:	208



On the south shore of Great Slave Lake, Pine Point Mines is the largest mining operation in the Northwest Territories. Low metal prices and weak demand for lead and zinc caused the mine to be closed temporarily in 1983. Photo courtesy of Cominco Limited.

Pine Point Mines Limited

Pine Point Mines Ltd. milled 2.4 million t of ore in 1982, down 1.1 million t from the amount of ore milled during the previous year. The grade of ore in 1982 increased to 3.0% lead and 7.3% zinc from 1.98% and 4.8% respectively in 1981 because lower prices forced higher cut-off grades. Despite the increase in grade, reduction in tonnage milled and a major cost restraint program, the company continued to incur operating losses during the fourth quarter of the year. On January 2, 1983 the company closed the Pine Point mine and milling operation. The shut-down will be reviewed on a monthly basis and operations will resume when economic conditions permit. During the first quarter of 1983 the company was negotiating cost-reducing concessions from the United Steelworkers Union on wage rates, Northern Canada Power Commission on electric power rates and CN Rail on its rail rates for concentrate shipments.

Type:	Open-pit
Location:	Pine Point
Product:	Lead, zinc
Mill Rate:	6 589 t per day (approximate)
Tonnes Milled:	2 400 000
Reserves:	31.75 million t (Dec. 31, 1982)
Reserve Grade:	2.4% lead, 6.1% zinc
Employees:	622

Terra Mines Limited

Terra Mines Ltd. resumed mining at the Silver Bear Mine, in the Camsell River area, in early 1982. Considerable improvements were made to the mill to increase the grade of concentrate produced. The company resumed milling in late March. In the last quarter of the year, Terra began production of ore from its Norex and Smallwood mines with the ore being processed at the Silver Bear mill.

Type:	Underground
Location:	15 km south of Great Bear on the Camsell River
Product:	Silver, lead, zinc, copper
Mill Rate:	146 t per day
Tonnes Milled:	36 108
Reserves:	44 662 t (Sept. 30, 1982)
Reserve Grade:	1 152 g silver per t
Employees:	78

Outlook

The outlook for new mine development in the Northwest Territories include production decisions to be made on Giant Yellowknife's Salmita and Cominco's Ptarmigan mine projects. Both are small gold projects which will become more attractive if the rising trend of gold prices continues in 1983. Ptarmigan ore could be trucked the few kilometres from the mine to the Con mill near Yellowknife for processing. At year end, the Giant Yellowknife Mines Ltd. reported that the possibility of further development of the Salmita gold property, 250 km north of Yellowknife, appears encouraging but a production decision will be delayed pending a further review of technical data and economic conditions. Giant Yellowknife spent \$2.98 million on exploration and

development of the property in 1982. The total expended to date on the Salmita Project is over \$7 million. The deposit is a relatively small orebody with a short expected mine life. The company plans to use the 145 t per day mill located on the Tundra property located 6 km from the Salmita property.

In the Nahanni region, the development of Cadillac Explorations Ltd.'s Prairie Creek Mine was nearly completed in the spring of 1982. However, work was suspended at that time because of low metal prices and the need for construction of an all-season road from the Liard Highway to the minesite.

Borealis Exploration Ltd. carried out further exploration work on its Roche Bay (74) iron property on the Melville Peninsula. The company has announced its intention to bring the property into production by 1987.

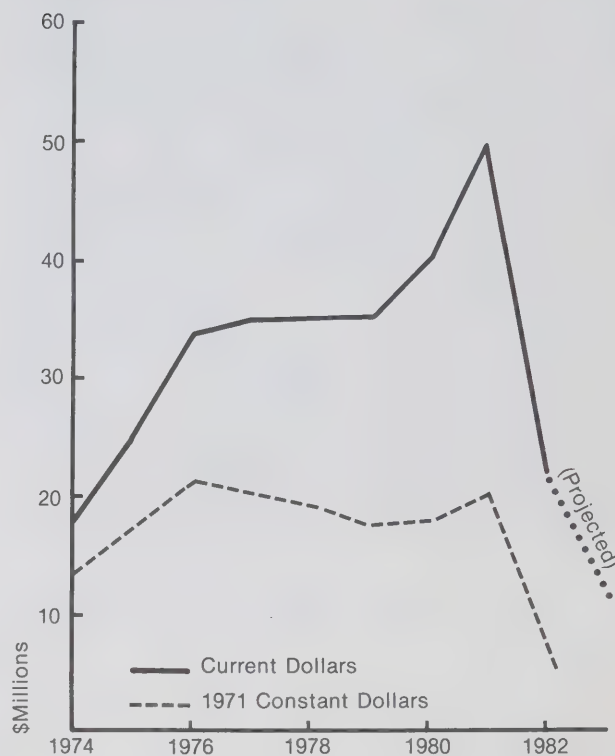
Mineral Exploration

The number of prospecting permits in the Northwest Territories issued during the calendar year 1982 increased to 91 from the 73 issued in the previous year, but of the 91 issued, 39 covered areas where coal exploration licences were granted in 1981. The area covered by staking of mineral claims declined drastically from 672 442 hectares in 1981 to 156 597 hectares in 1982.

Table 2
Claims Recorded in N.W.T.

Districts	1982		1981	
	Claims Recorded	Area (Hectares)	Claims Recorded	Area (Hectares)
Mackenzie	145	56 236	539	282 202
Arctic and Hudson Bay	106	82 837	479	381 514
Nahanni (Cordillera)	35	17 524	23	8 726
Total	286	156 597	1 041	672 442

Figure 4
Mineral Exploration Expenditures
Northwest Territories



Exploration expenditures during 1982 decreased to approximately \$22 million down from \$50 million in 1981. The Northwest Territories Chamber of Mines has forecast an exploration expenditure of \$12 million for 1983.

Table 3
Surface Diamond Drilling in N.W.T.*

	No. of Projects	Total Holes	Total Meters	Projects with more than 20 holes	
				No. of Projects	Meters
Cordillera (Nahanni District)	3	61	10 734	1	8 428
Pine Point-Slave Lowland (Interior Plains)	2	1 297	70 000	2	70 000
Arctic Islands	6	89	8 101	2	4 034
Keewatin (Churchill Province)	13	187	17 345	3	8 224
Southeast Mackenzie (Churchill Province)	3	34	4 885	1	2 359
East Arm Subprovince	0	0	0	0	0
Bear Province	8	194	10 654	3	2 386
Slave Province	10	111	14 775	2	8 166
TOTAL	45	1 973	136 494	14	103 597

*Data includes drilling reported to October 29, 1982. Not all drilling projects have been reported.

Total surface diamond drilling amounted to more than 136 494m during the first ten months of 1982, a decline from the 175 306m reported in the same period of 1981.

The number of properties explored during 1982 was 125, down from 214 explored in 1981 and 164 in 1980. Of the 125 properties, 36 were explored predominately for base metals, 34 were uranium properties and 32 were precious metal properties. Base metal exploration increased over uranium exploration for the first time in over a decade because of increased base metal activity in the Arctic Islands, Pine Point-Hay River area, East Arm of Great Slave Lake, the volcanic belts of the Slave and Bear provinces and areas along the Yukon border. Uranium exploration declined significantly because of weak markets but exploration continued to be widespread with activity in Proterozoic sedimentary basins; the Thelon-Dubawnt-Baker Lake-Amer Lake region, the Nonacho Basin and the Hornby Basin. Precious metals exploration expanded in the Kaminak-Rankin volcanic belt in the District of Keewatin and in the greenstone belts within the Slave Province.

A summary of exploration activities is given in Table 7, and locations of these explorations are shown by numbers on Map 2.

Uranium

In 1982, the pattern of world excess uranium supplies with concurrent downward pressure on prices brought a slump to uranium exploration following the boom years of the 1970's.

Fourteen companies explored for uranium in the Northwest Territories during 1982. Most were active in the Thelon-Dubawnt-Baker Lake-Amer Lake region with a few exploring the Nonacho Basin and a few in the Hornby Basin and Hepburn metamorphic-plutonic belt east of Great Bear Lake.

In the area west of Yathkyed Lake (16) a crew from *Aberford Resources Ltd.* conducted geological surveys and limited diamond drilling on showings located on AGIP-Noranda-Aberford claims. A second crew mapped the basement complex south and east of Bissett Lake (14).

AGIP Canada Ltd., drilled uranium showings east of Dubawnt Lake (17) and northwest of Nowleye Lake (18).

Urangesellschaft Canada Ltd., had four crews working in the Dubawnt-Baker Lake-Amer Lake region. These crews explored and drilled showings north of Nowleye and Kamilukuak lakes (19), conducted geological mapping and geophysical surveys on claims south of Thirty Mile Lake (13) and southeast of Tebesjuak Lake (12), and prospected and surveyed claims east of Sand Lake (2). A large crew drilled extensions of the Lone Gull deposit (4), drilled another prospect and carried out geological, geochemical and geophysical surveys on previously identified anomalies and showings in the vicinity.

Noranda Exploration Company Ltd. carried out geophysical surveys which outlined conductors which were drilled later in the year on claims south-east of Bissett Lake (15).

Comaplex Resources International Ltd. carried out geophysical surveys on its claims northeast of Forde Lake (13).

North of Mallery Lake (11), *Anaconda Canada Exploration Ltd.* conducted mapping, geochemical and geophysical surveys and diamond drilled geophysical anomalies.

Westmin Resources Ltd. carried out detailed geochemical, geophysical and geological studies on its properties which extend from Amer Lake (1) to the edge of the Thelon Game Sanctuary north of Beverly Lake (10).

Uranerz Exploration and Mining Ltd. explored prospecting permits southeast of Deep Rose Lake (3), north of Beverly Lake (6) and south of Garry Lakes (8) with airborne and ground geophysical surveys and geochemical sampling.

Inco Metals Ltd. carried out geochemical, geophysical and geological surveys on its claims southeast of Sand Lake (5).

South of Garry Lakes (7), *Kidd Creek Mines Ltd.* explored and drilled its properties while *Union Oil Company of Canada Ltd.* carried out geochemical, geophysical and geological surveys on its properties (9).

In the Thelon Basin, *Urangesellschaft Canada Ltd.* explored claims held in partnership with *Hudbay Minerals Ltd.* in the Elk River belt (21) and *PNC Exploration (Canada) Ltd.* explored its prospecting permits and claims near Foster Lake (20).

PNC Exploration (Canada) Ltd. prospected, mapped and drilled 3 100m on its several properties in the Thekulthili Lake area (23, 24) in the Nonacho Basin. The company planned to drill an additional 2 000m on its properties in late 1982 or early 1983.

Uranerz Exploration and Mining Ltd. mapped several claim groups with potential for small high grade uranium deposits in the Power Lake area (22).

In the eastern-most part of the Hornby Basin, *B.P. Minerals Ltd.* explored in the Contact Lake area (26) while nearby at Munch Lake, *Anaconda Canada Exploration Ltd.* in a joint venture with *B.P. Minerals* and *Union Carbide Canada Ltd.* carried out geochemical, geophysical and boulder train surveys and overburden drilling at three sites.

To the south, from a camp at Fontano Lake (25) *Uranerz Exploration and Mining Ltd.* explored three areas in the northern part of the Hepburn metamorphic-plutonic belt.

Base Metals

Exploration for base metals expanded in the Arctic Islands and declined slightly in the traditional areas of base metal exploration: Pine Point-Hay River area, East Arm of Great Slave Lake, Kaminak-Rankin Inlet area, the Bear and Slave structural provinces and the Mackenzie Mountains.

In the Arctic Islands, *Petro-Canada Ltd.* explored the 39 prospecting permits it was granted in 1982 for lead and zinc deposits in the Allen Bay-Read Bay carbonates and Cape Phillips shales of the Bay Fiord-Strathcona Fiord area (28) of Ellesmere Island. The company also explored the Lower Paleozoic sediments and Precambrian gneisses on the west side of the Kane Basin (27).

A small crew from *Cominco Ltd.* examined showings in the Cornwallis lead-zinc district (29). Drilling to outline ore at the Polaris lead-zinc mine (i) continued.

Nanisivik Mines Ltd. explored areas near the Nanisivik Mine (f) in its search for additional ore-grade material. The company extensively tested airborne geophysical anomalies detected in the Neohelikian Borden Basin (30) southeast of the mine.

In the Kaminak-Rankin volcanic belt *Esso Minerals Ltd.* prospected, conducted geophysical surveys and pack-sack drilled prospects in the Kaminak (52), Yandle (53) and Carnecksluck (54) lakes areas for precious and base metals.

South of the East Arm of Great Slave Lake, prospectors *L. Anderson* and *W. Kizan* discovered several sulphide showings at Rutledge Lake (31). At the southwest end of the East Arm (32), *E. Dean* and associates explored for base metal mineralization.

Pine Point Mines Ltd. carried out large programs of induced polarization surveys and diamond drilling on its property near the Pine Point Mine (b). In 1982, Pine Point Mines reported more than 91 000m of drilling and the discovery of a new deposit of the same size and grade as the 0.9 million t (20 per cent lead-zinc) ore deposit found last year. The new deposit is two kilometres west of last year's discovery.

To the west of Pine Point, *Westmin Resources Ltd.* (33) drilled 6 096m on the Slave Reef property and *Cominco Ltd.* carried out seismic surveys on its Hay West Project (34) to outline favourable geological structures.

In the Bear Structural Province, *Noranda Exploration Company Ltd.* explored and excavated trenches on the BL and TROUT claims at DeVries Lake (35).

Exploration for massive volcanogenic sulphide deposits was more widespread in the Slave Structural Province than in the Bear Province where volcanic belts are less pervasive. Three companies conducted programs in 11 areas within the Slave Province.

Kidd Creek Mines Ltd. was the most active company within the Slave Province exploring three properties and nine prospecting permits. The company drilled more holes into the Hood River deposits near Amoogabooga Lake (36), conducted electromagnetic surveys in the Izok Lake area (37), drilled 4 000m in 16 holes on the GONDOR claims near Olga Lake (38) which Kidd Creek optioned from *Noranda Exploration Company Ltd.* An unspecified tonnage of volcanogenic massive copper-zinc-lead-silver bearing sulphides was outlined by drilling. *Kidd Creek Mines* explored its other claim groups in the Central Volcanic Belt (38). *Kidd Creek Mines* geologically mapped its nine prospecting permits which occur in three areas 76B (41), 76G (40) and 76H (39).

Noranda Exploration Company Ltd. drilled exploration targets on several claim groups including the ICE, DELTA and SAXIFRAGE claims on the Hood River (42), the ARES claims north of the Hood River (43) and the CANOE claims (42) to the west of the ARES group.

Cominco Ltd. explored the KCL claims (44) in the High Lake area with a geochemical survey.

Noranda Exploration Company Ltd. explored numerous claim groups in the Hope Bay volcanic belt (45). Further south Noranda explored for base metals as a secondary target on its three prospecting permits near Uist Lake (63).

Exploration for base metals declined in the Nahanni District but activity was widespread.

Cadillac Explorations Ltd. constructed mine and mill buildings at its Prairie Creek Mine (silver, zinc, lead, copper) (46) but suspended work at the mine site in June. Cadillac's major shareholder and partner in the mine, *Procan Exploration Company* carried out regional stream geochemical sampling north of the mine (46).

Placer Development Ltd. carried out some exploration work at its Howards Pass lead-zinc property (48). The company announced that its XY deposit, which is predominately in the NWT, has drill indicated reserves of 59 million t of 2.1 percent lead and 5.4 percent zinc including 8.2 million t of 5.5 percent lead and 10.6 percent zinc. There is also reserve tonnage at the ANNIV deposit (in the Yukon) and inferred reserves for the Howards Pass property in excess of 360 million t of 7 percent combined lead-zinc.

On the VULCAN claims (47) *Aberford Resources Ltd.* drilled 305m and carried out a geochemical and mapping program.

Canadian Nickel Company Ltd. carried out a geochemical survey on its prospecting permits east of Misty Lake (49).

Noranda Exploration Company Ltd. carried out a regional exploration program in the Macmillan Pass area (67).

Gold

Exploration for gold deposits was concentrated in the volcanic belts in the Churchill and Slave structural provinces.

In the Kaminak-Rankin volcanic belt in the District of Keewatin seven companies explored for gold.

At the eastern end of the Kaminak-Rankin belt, *Inco Metals Ltd.* prospected gold showings at the southern end of the Pork Peninsula (51), *Silver Chief Minerals Ltd.* prospected its claims in the Maze Lake-Pistol Bay area (51) and *Westward Resources Ltd.* staked and prospected showings west and north of Rankin Inlet (50).

Esso Minerals Ltd. carried out a program of prospecting, geophysical surveying and packsack drilling of precious and base metal showings near Kaminak Lake (52), Yandle Lake (53), Carnecksluck Lake (54) and north of Cullaton Lake (h).

Kognak Gold Explorations Ltd. prospected and completed a magnetometer survey over part of a prospecting permit acquired by the company east of Otter Lake (55).

Suncor Inc. carried out geochemical, geophysical and geological surveys over anomalies detected during 1981 surveys on claims and prospecting permits in the Fitzpatrick-Watterson lakes area (56) and on claims east and west of Cullaton Lake (h).

North of Griffin Lake (57), *Noranda Exploration Company Ltd.* prospected and conducted geophysical surveys over volcanic ultramafic and sedimentary assemblages.

Six companies explored for gold in veins and shear zones in the volcanic belts of the Slave Structural Province.

Giant Yellowknife Mines Ltd. continued to evaluate its Salmita gold deposit at Matthews Lake (58), 260 km northeast of Yellowknife. Company crews extended the decline, drove two drifts, mapped and sampled the workings. Eighteen drill holes totalling 2 076m were drilled to test the downward extensions of the gold-bearing vein.

Noranda Exploration Company Ltd. mapped and prospected the RUSS-1 claim, near the Discovery Mine (60) a former gold producer, the WIJ, INN and EDI claims (59), and three prospecting permits near Uist Lake (63). The company conducted geophysical surveys on properties in the Russell-Slemon lakes area (62) and on the FAT claims in the Courageous Lake area (58).

In the Gordon Lake area (61), *Black Ridge Gold Ltd.* drilled 20 holes on the MQ-001 claim, *Kengate Resources Ltd.* drilled 4 holes on the JIM (F0614) claim and *Burnt Island Gold Ltd.* drilled 21 holes on the GOO claims.

Cominco Ltd. explored a number of properties in the High Lake area (44).

In the Nahanni area, two prospectors, *Linberg and Sibbeston*, explored for placer gold and silver along the South Nahanni (64) and Broken Skull (64) rivers.

Further north, *Canadian Nickel Company Ltd.* (65) staked several arsenic anomalies which were shown in Geological Survey of Canada Open File 868. The company is using arsenic as a geochemical pathfinder for gold mineralization.

Silver

Exploration for silver deposits was confined to the Camsell River area (d) where *Terra Mines Ltd.* explored several silver veins with surface and underground drilling programs.

Tungsten

Exploration for tungsten mineralization was conducted along the Yukon border from the community of Tungsten to the Macmillan Pass area.

Canada Tungsten Mining Corp. drilled three holes on its Cantung tungsten mine lease (a) to confirm the extension of ore-bearing skarn under the Flat River valley. A few kilometers to the north the company mapped parts of the Baker tungsten prospect (a).

Union Carbide Canada Ltd. had three diamond drills at work on its LENEED property (66). Detailed mapping and stratigraphic studies were carried out on the tungsten deposit.

In the Macmillan Pass area, *Amax of Canada Ltd.* carried out a general survey program for infrastructure on its Mactung tungsten deposit (67). The company plans to bring the deposit into production, possibly in 1986 or 1987.

The release in August, 1982 of Geological Survey of Canada Open File 868 created a small staking rush when *Cominco Ltd.*, *Union Carbide Canada Ltd.*, *Amax of Canada Ltd.* and *Aberford Resources Ltd.* staked claims on tungsten anomalies in map area 105-I (48).

Tantalum-Columbium

Highwood Resources Ltd. and *Placer Development Ltd.* bulk sampled the central part of the Blachford Lake Complex (68) for metallurgical testing of tantalum-columbium (niobium) — rare earth mineralization.

M. Senkiw prospected the outer margin of the Blachford Lake Complex near Grace Lake (68).

Diamonds

Diamond exploration during 1982 expanded in the Nahanni region as *CF Mineral Research Ltd.* sampled the Mountain Diatreme (69) and its permits (70) in the Franklin Mountains for diamond-bearing kimberlite.

Diapros Ltd. continued its search for kimberlitic pipes and dikes on its permit northeast of the Blackwater River (70) in the Franklin Mountains.



MINERAL EXPLORATION AND MINING NORTHWEST TERRITORIES — 1982

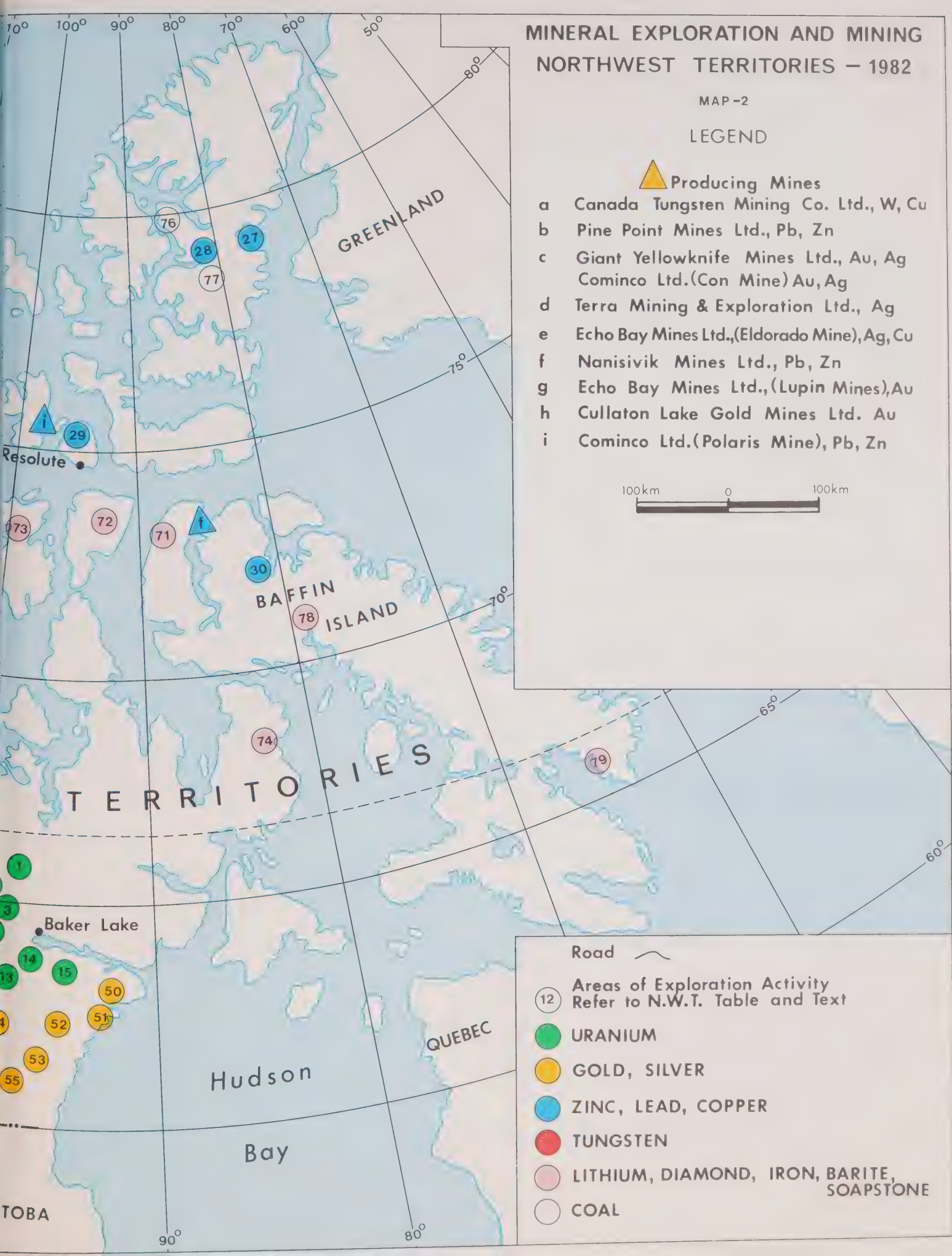
MAP-2

LEGEND



Producing Mines

- a Canada Tungsten Mining Co. Ltd., W, Cu
- b Pine Point Mines Ltd., Pb, Zn
- c Giant Yellowknife Mines Ltd., Au, Ag
Cominco Ltd.(Con Mine) Au, Ag
- d Terra Mining & Exploration Ltd., Ag
- e Echo Bay Mines Ltd.,(Eldorado Mine), Ag, Cu
- f Nanisivik Mines Ltd., Pb, Zn
- g Echo Bay Mines Ltd.,(Lupin Mines), Au
- h Cullaton Lake Gold Mines Ltd. Au
- i Cominco Ltd.(Polaris Mine), Pb, Zn



Diapros Ltd. returned to the southern Arctic Islands in its search for diamond-bearing kimberlite on the Brodeur Peninsula of Baffin Island (71), Somerset Island (72) and Prince of Wales Island (73). In 1973 and 1974 Diapros reported the recovery of small diamonds from kimberlite intrusions on Somerset Island.

Iron

Borealis Exploration Ltd. completed a program of 3 440m of diamond drilling, detailed magnetometer and geological surveys, trenching and bulk sampling on its iron property at Roche Bay on the Melville Peninsula (74).

Prospector *W. Reid* staked and prospected a hematite showing on Victoria Island (75).

Coal

Petro-Canada Ltd. explored the coal-bearing formations in the Slidre Fiord area (76) southeast of Eureka and the Bay Fiord — Strathcona Fiord area (77) further to the south.

Soapstone

Dr. W. Gibbins, the Arctic Island District Geologist, examined ultramafic rocks east of Mary River (78) and southeast of Pangnirtung (79) as possible sources of carving stone.

Yukon Territory

Mineral Production and Development

Mineral production in the Yukon Territory during the calendar year 1982 was valued at \$168 million compared to \$268 million in 1981 (see Table 9). The value of mineral production declined 37 percent from 1981. At year-end, all of the major lode mines in the Yukon were shut down in the wake of depressed metal markets. Cyprus Anvil Mining Corporation and United Keno Hill Mines Ltd. closed in mid-year and Whitehorse Copper Mines Ltd. closed permanently at year-end because of ore reserve depletion. Cyprus Anvil's Tantalus Butte coal mine did not open during 1982 because Cyprus Anvil had a sufficient stockpile of thermal coal at its Faro mill to dry its lead-zinc concentrate output. The number of Yukon placer gold operations also declined because of low gold prices during the first half of 1982. Yukon Barite Co. Ltd. commenced seasonal production of barite in mid-October at its Samovar Mine near Macmillan Pass on the North Canal Road but closed operations in December, 1982.

Prospects for 1983 hinge largely on whether Cyprus Anvil will re-open its lead-zinc mine near Faro. The mine is the largest private sector employer in the Territory. Since mid-1982, the Department of Indian Affairs and Northern Development and the company have been co-operating in the development of action plan proposals to get the mine back into production. Discussions were continuing at year-end.

Mines

Mineral production came from four mining establishments: Cyprus Anvil's Faro Mine (lead, zinc, silver, gold), United Keno Hill Mines (silver, lead, zinc), Whitehorse Copper Mine (copper, gold, silver) and Yukon Barite's Samovar Mine (barite).

Table 4
Estimated Mineral Production
Yukon Territory, 1981-1982

Company and Commodity Mined	1982		1981	
	t	kg	t	kg
<i>Cyprus Anvil Mining Corp.</i>				
Faro Mine				
lead	33 905		56 111	
zinc	59 392		78 876	
silver		28 017		52 502
gold		62.8		151
Tantalus Butte				
coal	—		20 860	
<i>United Keno Hill Mines Ltd.</i>				
silver		37 284		36 020
lead	946		1 018	
zinc	119		—	
<i>Whitehorse Copper Mines Ltd.</i>				
copper	7 236		9 068	
silver		4 716		6 045
gold		342		489
<i>Yukon Barite Company Ltd.</i>				
barite	10 000		—	

Source - Department of Indian Affairs and Northern Development.

The Yukon accounted for 12.4 percent of the lead, 5.7 percent of the zinc, 4.6 percent of the gold, 5.8 percent of the silver and 1.2 percent of the copper produced in Canada during 1982. The Yukon accounted for 2.4 percent of the value of Canadian metallic mineral production.

The operating mines employed an average of 1 030 persons during the first half of 1982. This employment figure declined drastically in the second half of the year after the mines of Cyprus Anvil and United Keno Hill closed down. Whitehorse Copper closed on Dec. 31, 1982. At the end of 1982, only 173 persons were employed at the mines.

The Yukon placer gold mining industry provided seasonal employment for 650 persons.

Cyprus Anvil Mining Corporation – Faro Mine

Cyprus Anvil Mining Corporation closed its Faro Mine (b) on June 4, 1982 when low world lead and zinc prices made its operation uneconomic. Previously, in March, the company had reduced its work-force by 95 persons to cut operating costs. Exploration was conducted on Cyprus Anvil's Grum and Vangorda deposits with completion of 5 334m of drilling. These two deposits could be brought into production in the late 1980's or 1990's if metal prices increase and northern lead-zinc mining operations again become viable. The company has negotiated a new two-year contract with its unionized employees which includes measures to significantly increase productivity. At year end, 125 employees were employed on staff.

Type:	Open-pit
Location:	209 km northwest of Whitehorse
Product:	Zinc, lead, silver
Mill Rate:	10 328 t per day
Tonnes Milled:	1 635 049
Reserves:	30.9 million t in Faro deposit (Dec. 31, 1981)
Reserve Grade:	3% lead, 4.6% zinc, 38.7 g silver per t
Employees:	620 (Average for Jan-June)

Cyprus Anvil Mining Corporation – Tantalus Butte Mine

The Tantalus Butte Coal Division (c) of Cyprus Anvil Mining Corporation did not operate during 1982 as there was a large stockpile of thermal coal at the Faro base metal mine for drying the lead-zinc concentrates. Cyprus Anvil plans to develop a new coal mine near Ross River to replace the Tantalus Butte Mine, which only has reserves for one year's production remaining.

Type:	Open-pit
Location:	Carmacks
Product:	Sub-bituminous coal
Tonnes Produced:	Nil
Reserves:	27 000 t (Dec. 31, 1981)
Employees:	Nil

United Keno Hill Mines Limited

United Keno Hill Mines Ltd. suspended operations at its Keno Hill (d) properties on July 13. The company had previously attempted to cut operating costs by closing down four open pit mines with consequent reduction of its 283 person work force. Mining efforts were concentrated on the Elsa, Husky and Ruby mines, the three richest silver mines in the mining camp. Less than 10 percent of the exploration program planned for the area was completed. The property is being maintained on a standby basis by 23 employees, pending improvement in silver prices.

Type:	Underground and open-pit
Location:	50 km northeast of Mayo
Product:	Silver, lead, zinc
Mill Rate:	377 t per day
Tonnes Milled:	50 340
Reserves:	189 874 t (Dec. 31, 1982)
Reserve Grade:	885 g silver per t, 3.7% lead
Employees:	232 (Average for Jan-June)

Whitehorse Copper Mines Limited

Whitehorse Copper Mines Ltd. (a) operated for the whole year. The company attempted to reduce operating costs by increasing the number of tonnes milled per day to 2 400 from the average of 2 025 tpd in 1981, as the average ore grade decreased from 1.42 percent copper in 1981 to 1.2 percent copper in 1982. Continued exploration in the Whitehorse Copper Belt which included 2 606m of drilling on the North Star property (a) located only scattered low-grade copper mineralization. The mine closed on December 31, 1982. By early January, 1983 only 25 persons were employed at the mine site for dismantling and rehabilitation activities.

Type:	Underground
Location:	11 km south of Whitehorse
Product:	Copper, gold, silver
Mill Rate:	2 400 t per day
Tonnes Milled:	814 320
Ore Reserves:	Nil
Employees:	161

Yukon Barite Company Limited

The Yukon Barite Company Limited commenced mining barite at the Samovar Mine (e) on the TEA property in the Macmillan Pass area in mid-October. Mining ceased in early December. Approximately 10 000 t of crude barite was mined and trucked to Ross River where a processing mill was under construction in early 1983. The company has contracts to supply ground barite to Beaufort Sea petroleum operators over a two year period. Shipments which were expected to begin in early 1983 may be delayed pending completion of mill construction. The ground barite will be bulk packed into two-tonne boxes for shipment by truck to Tuktoyaktuk. The company hopes to be able to negotiate additional contracts once it has demonstrated its ability to deliver the product.

Type:	Open-pit
Location:	193 km northeast of Ross River
Product:	Barite
Mill Rate:	Unknown
Tonnes Milled:	Nil
Reserves:	250 000 t
Reserve Grade:	Specific gravity 4.24
Employees:	7

Outlook

Prospects for 1983 hinge mainly on whether mines currently closed in the Yukon will re-open. The current outlook for re-opening of both Cyprus Anvil's Faro Mine and United Keno's mining operations is uncertain as profitable operation in the future will depend on significant recovery in metal prices, price stability and cost cutting measures.

Development work was conducted on a few properties during the year. Hudson Bay Mining and Smelting continued its underground exploration program on its Tom (4) lead-zinc-silver property but this work was terminated in March because of low metal prices and the underground workings were allowed to flood.

Arctic Red Resources Corp. carried out underground development work on its Laforma gold property (52) west of Carmacks. The 355m of drilling indicated that gold values are increasing with depth.

Nearby and to the east on Tinta Hill (53), Silver Tusk Mines Ltd. and Panther Mines Ltd. carried out underground exploration on their gold-silver-zinc-lead-copper property. In September, they announced their intention to place the property into production at a rate of 91 to 136 t per day if project financing is secured. The tonnage indicated by underground work would allow for a mine life of two years.

Among the better mineral deposits which could be classified as potential medium and long-term producers in the Yukon are:

- the \$171 million Mactung Mine development of Amax of Canada Ltd., a tungsten deposit, near Macmillan Pass on the Yukon-Northwest Territories border. While most of the deposit lies within the Yukon Territory, the mill and other surface facilities will be located largely in the Northwest Territories. In January, 1983 the company announced that the start-up date for initial production is late 1986 or early 1987.
- Hudson Bay Mining and Smelting Co. Ltd.'s Tom lead-zinc-silver deposit and Aberford Resources Ltd.'s Jason lead-zinc-silver deposit, both in the Macmillan Pass area.
- the Howards Pass lead-zinc property of Placer Development Ltd. and Cygnus Mines Ltd. near the Yukon-Northwest Territories border.
- Cyprus Anvil Mining Corp.'s Grum, Vangorda and DY lead-zinc-silver deposits in the Anvil District near Faro. The company's long term expansion plan to bring the Grum and Vangorda deposits into production by the late 1980's has been put on the shelf pending resolution of the future of the Faro mine.

Placer Mining

Yukon placer gold production was estimated at 2 290 kg (73 626 oz.) in 1982, or approximately 80 percent of the 1981 production of 2 885 kg (92 756 oz.).

The decrease in the price of gold in 1982 caused a decline in the number and size of mining operations. The amount of gold produced and the amount of staking and evaluation activities also declined.

While the price of gold cannot be forecast with any certainty, prospects for 1983 are buoyant, as the world price of gold has increased. On January 31, 1983 the market price of gold was \$617 an ounce compared to the low of \$385 an ounce on June 21, 1982. The average mining costs of Yukon placer gold was estimated in 1982 at approximately \$345 per ounce (31.1 g) of gold produced.

Placer mining operations during 1982 provided approximately 270 man-years of work for 650 seasonally employed persons. The Yukon placer gold production comprises 3.7 percent of the total 1982 Canadian gold production.

Mining was concentrated in the Sixty Mile (80), Klondike (81), Clear Creek, (83), Mayo (44), Burwash (84) and Carmacks (52) regions.

The Yukon placer mining guidelines, drafted by the Department of Indian Affairs and Northern Development, Department of Fisheries and Oceans and Department of Environment, propose a multiple resource management approach to placer mining in the Yukon Territory. The guidelines prescribe water quality standards for waste water emanating from placer mining operations.

A public review of the proposed draft guidelines will be held during 1983 in a number of Yukon communities.

Mineral Exploration

Mineral exploration in the Yukon declined drastically during 1982 with exploration expenditures estimated at \$22 million, down from the \$50 spent in 1981. The year was characterized by low levels of on-property work, fewer drill programs and the staking of fewer add-on claims and new claim groups.

The outlook for exploration expenditure in 1983 is that it will remain at a depressed level until metal prices increase significantly. The British Columbia and Yukon Chamber of Mines has projected an exploration expenditure for 1983 of \$11 million based on a survey of its members.

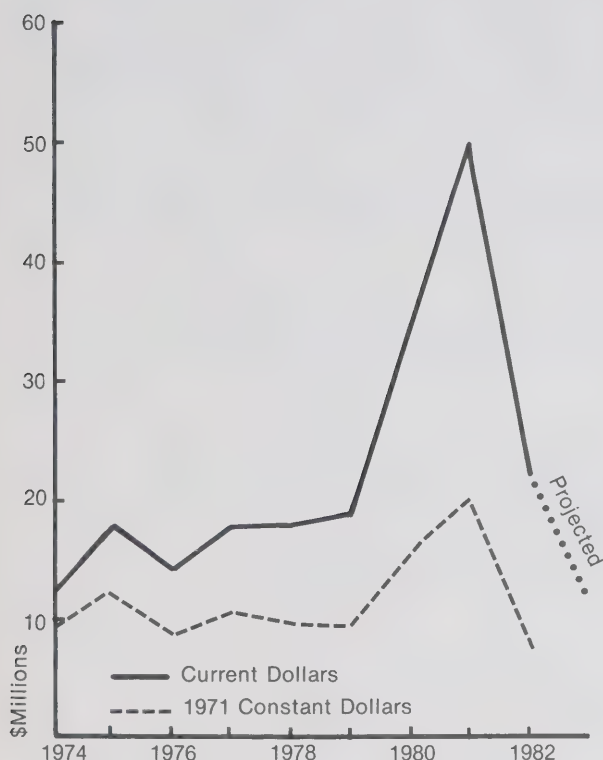
Mineral claims staked and recorded during the year with comparative figures for 1981 are:

Table 5
Claims Recorded in Yukon

District	1982 Claims Recorded	1981 Claims Recorded
Whitehorse	981	3 586
Dawson	538	1 068
Mayo	408	3 208
Watson Lake	1 852	3 430
Total	3 779	11 292

In addition, 3 966 placer claims and 297 placer leases were registered in 1982.

Figure 5
Mineral Exploration Expenditures
Yukon Territory



During the year 1982, 116 properties were explored. Of these 54 were base metal properties including 43 lead-zinc properties, 25 were precious metal properties, 14 were tungsten properties and the remainder were explored for various other mineral commodities.

Base metal deposits, particularly shale-hosted sedimentary exhalative deposits were actively explored in the Macmillan Pass area, the Rancheria and Earn Lake areas west of Watson Lake, the Frances Lake area and in the Anvil District. Precious metal exploration was widespread with major areas west of Carmacks and south of Whitehorse. Exploration for tungsten, tin and molybdenum was widespread with a major concentration north of the Rancheria area, west of Watson Lake. Placer gold exploration activity decreased during 1982 but a notable discovery of an auriferous deposit of White Channel type gravel was made on Paradise Hill, Hunker Creek (81) approximately 1 000m from any previously worked deposits of the same type.

A summary of exploration activities is given in Table 6, and locations of these exploration activities are shown by numbers on Map 1.

Lead-Zinc-Silver

Over a dozen companies explored for lead-zinc deposits in the Yukon during 1982. Most were active in the Selwyn Basin in the eastern Yukon with some activity taking place in the Rancheria area, west of Watson Lake, and in the Ogilvie Mountains, north-east of Dawson.

In the western Ogilvie Mountains, *Mattagami Lake Exploration Ltd.* carried out geological mapping and geochemical surveys on the WENDY (1) and KZ (2) claims. Ten small trenches were blasted on the KZ claims.

Archer, Cathro and Associates Ltd. on behalf of *ZX Joint Venture* carried out reconnaissance scale soil and rock geochemical surveys and cleaned out old trenches on the TUDL (3) claims in the Keno Hill area.

The main area of lead-zinc exploration is in the Macmillan Pass region where shale is the host rock for lead-zinc-barite deposits. *Hudson Bay Mining and Smelting Ltd.* proceeded with additional underground work at its TOM (4) deposit until March when underground work was terminated and the workings were allowed to flood. Minor geological mapping and a drill core logging program were carried out during the summer.

On the nearby JASON deposit (5), a few kilometres to the west, *Aberford Resources Ltd.*, the major partner in *Ogilvie Joint Venture*, drilled 2 850m in five holes on the south zone where four mineralized intersections were encountered.

Cominco Ltd. carried out geological mapping, geochemical and geophysical surveys, trenching and diamond drilling (four holes) on the NIDD claims (5) which adjoin the JASON property to the north. *Cominco* optioned the HASTEN, BASIN and FETCH claims (5), located south of the JASON, from *Welcome North Mines Ltd.* and carried out mapping and geochemical surveys. Mapping indicated that the mineralized horizon found on the JASON may extend onto these claims.

In the same area, *Amax Inc.* carried out a soil geochemistry survey on the FAN claims (5).

West of Macmillan Pass *Hudson Bay Exploration and Development Ltd.* conducted detailed geological mapping and soil and rock geochemistry programs on the FAL claims (6), on the BAR claims (77), on the MAC claims (77), and on the SUN claims (6). The BAR, MAC and SUN claim groups cover bedded barite showings.

In the Dromedary Mountain area (7), *Anaconda Canada Exploration Ltd.* carried out a program of geological mapping, soil geochemistry and geophysical surveys on the ACE claims and nearby CLAIRE, BUSH and EARN claims. To the west, *Anaconda* carried out similar surveys on its KAL and BUM claims (8). The company conducted minor geological mapping and soil geochemical surveys on the RABBIT claims (9).

Kidd Creek Mines Ltd. carried out geological mapping, geochemical and geophysical surveys on its SUE claims (9).

Northwest of Faro, *Noranda Exploration Co. Ltd.* optioned the LADY DI claims (10) from *Welcome North Mines Ltd.* and then conducted a geophysical survey.

Exploration in the Anvil camp was concentrated on the Grum deposit (11) where *Cyprus Anvil Mining Corp.* drilled 24 diamond drill holes totalling 5 335m. Further east, the company carried out minor property work on the TENAS claims (12).

Southwest of Ross River, *Amax Exploration Inc.* and *Procan Exploration Company* conducted geological mapping and soil geochemistry on their GREW claims (13).

Southeast of Ross River, and north of the Pelly River, *Hudson Bay Exploration and Development Ltd.* carried out a program of geological mapping and geophysical surveys on the RAB claims (14). A little further east *Hudson Bay* drilled seven holes on the SHALE, RENO and EAGLE claims (14) in the Pelly Banks area.

Placer Development Ltd. and *Cygnus Mines Ltd.* carried out an economic analysis of their Howards Pass property (15) and concluded that mining is not economically viable in the current economic environment. *Placer* announced that the XY deposit, which is predominately in the Northwest Territories, has drill indicated reserves of 59 million t of 2.1 percent lead and 5.4 percent zinc including 8.2 million t of 5.5 percent lead and 10.6 percent zinc. The ANNIV deposit, which is wholly within the Yukon, has drill indicated reserves of 61 million t of 2.1 percent lead and 5.4 percent zinc. The Howards Pass property has inferred reserves in excess of 360 million t of 7 percent combined lead-zinc.

In the Francis Lake area (16), *Cominco Ltd.* conducted geological mapping, geochemical and geophysical surveys on the FIN claims.

Chevron Standard Ltd. carried out a program of geological mapping and soil chemistry surveys on its BAR claims (17), 45 km north of Teslin.

East of Teslin, *BRX Mining and Petroleum Ltd.* carried out property work on the MEISTER claims (18).

On the large MIDWAY property (18), which spans the Yukon-BC border, *Regional Resources Ltd.* and its partners *Amax of Canada Ltd.* and *Procan Exploration Company* carried out a large drilling program on their lead-zinc-silver deposit in British Columbia. Geophysical surveys on the claims in the Yukon located several conductors which are coincident with lead-zinc-silver geochemical anomalies located in 1981.

North of the MIDWAY claims, *Regional Resources Ltd.* carried out a program of geological mapping, soil geochemical sampling and trenching on the MR claims (19) and on the LOGAN claims (20).

North of Watson Lake, *Kerr Addison Mines Ltd.* evaluated the GE claims (21) by a program of geological, geochemical and geophysical surveys.

Archer, Cathro and Associates Ltd. on behalf of the *ZX Joint Venture*, examined three claim groups northeast of Watson Lake. The company conducted geological mapping and stream sediment geochemical surveys on the AUP claims (22), geological mapping and soil, rock and stream sediment geochemical surveys on the CUZ claims (22) and soil and rock geochemical surveys on the QUIVER claims (22).

East of Watson Lake, *Sulpetro Minerals Ltd.* geologically mapped and carried out a soil geochemical survey on its JONI claims (23). In the same area, *Serem Ltd.* conducted geological mapping, prospecting and stream sediment geochemical programs on the LOOTZ claims (23) and *Archer, Cathro and Associates Ltd.* on behalf of the *ZX Joint Venture*, carried out a detailed geochemical program on the QUO claims (24).

Further east, *Archer, Cathro and Associates Ltd.*, on behalf of *Kidd Creek Mines Ltd.* carried out reconnaissance scale geological mapping and geochemical surveys on the TRANZ claims (25) and on the MARS and RUSH claims (26).

Tungsten

Declining tungsten prices resulted in a decline in tungsten exploration programs in 1982 compared to 1981.

Canada Tungsten Mining Corp. continued working on its Dublin Gulch project (27) north of Mayo by conducting geological mapping, soil geochemical and geophysical surveys, trenching and 750.6m of drilling on the ALEC and MAR claims.

West of Mayo, *Canada Tungsten Mining Corp.* carried out a program of geological mapping and soil and stream sediment geochemical surveys on the CC claims (28) in the Clear Creek area.

Southeast of Mayo on Kalzas Mountain, *Union Carbide Canada Ltd.* explored tungsten and tin mineralization on the WOLF, DAVID, PAT and BLACKIE claims (30) with geological mapping, a rock geochemical survey and overburden and bedrock trenching. Nearby on Clarke Peak, *Amax Exploration Inc.* prospected and geologically mapped its DOPE claims (30).

Amax Exploration Inc. carried out geological mapping and stream sediment geochemical surveys on its DRILL claims (29) near Ethel Lake, south of Mayo.

Northwest of Dawson, *Noranda Exploration Co. Ltd.* drilled 719.4m on its RAIL claims (31).

Hudson Bay Exploration and Development Co. Ltd. conducted geological and geochemical surveys on its SIM claims (32), west of Macmillan Pass.

West of Ross River, *Hudson Bay Exploration and Development Co. Ltd.* completed minor geological mapping on its CAB claims (33) and geological mapping, geophysical surveys and trenching on the nearby BIG and SAM claims (33).

Hudson Bay Exploration and Development Co. Ltd. also worked on the COOT claims (34) south of Aishihik Lake where geochemical and geophysical surveys and trenching were carried out.

Serem Ltd. conducted a program of prospecting, geochemical surveys and geological mapping of its SOURCE claims (35) north of Rancheria.

North of Watson Lake, *Hudson Bay Exploration and Development Co. Ltd.* carried out a soil geochemical survey over the TOD claims (36).

Molybdenum

In spite of depressed molybdenum markets, the level of molybdenum exploration continued at the same level as in 1981.

Amoco Canada Petroleum Co. Ltd. and *Tintina Mines Ltd.* drilled over 4 000m in four holes on the BUG claims (37) on the Red Mountain porphyry deposit.

Northwest of Dawson, *Cominco Ltd.* drilled its PLUTO claims (38).

Tin

The level of exploration for tin in 1982 was almost the same as in 1981. Exploration for tin is centered in the area north and northeast of Teslin.

The *DC Syndicate* drilled 731.7m on its JC claims (39) and 153.9m on the MUN claims (40). The company carried out geological mapping and magnetometer surveys on the MUN and ROAD claims (40).

To the north and northeast of Teslin, the *DC Syndicate* mapped and conducted geochemical and geophysical surveys on its FF claims (41). Nearby *J.C. Stephen Explorations Ltd.*, acting as manager for the *DC Syndicate* mapped and carried out geochemical and geophysical surveys on the ABBA claims (41) and mapping and geochemical surveys on the JAR claims (39).

MAP-1
YUKON
MINERAL EXPLORATION AND
MINING - 1982

LEGEND



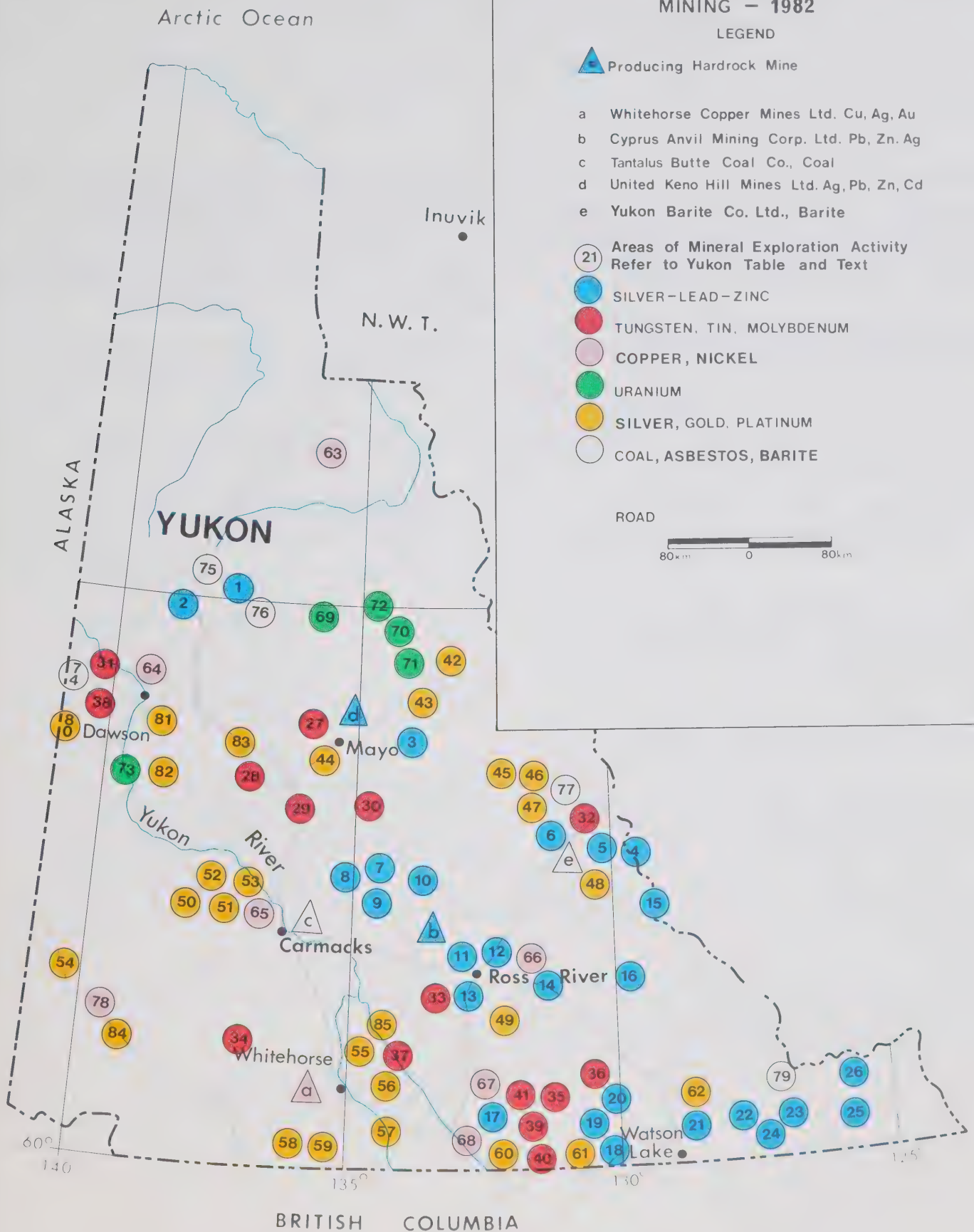
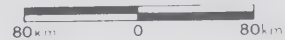
Producing Hardrock Mine

- a Whitehorse Copper Mines Ltd. Cu, Ag, Au
- b Cyprus Anvil Mining Corp. Ltd. Pb, Zn, Ag
- c Tantalus Butte Coal Co., Coal
- d United Keno Hill Mines Ltd. Ag, Pb, Zn, Cd
- e Yukon Barite Co. Ltd., Barite

(21) Areas of Mineral Exploration Activity
Refer to Yukon Table and Text

- (Blue circle) SILVER-LEAD-ZINC
- (Red circle) TUNGSTEN, TIN, MOLYBDENUM
- (Pink circle) COPPER, NICKEL
- (Green circle) URANIUM
- (Yellow circle) SILVER, GOLD, PLATINUM
- (White circle) COAL, ASBESTOS, BARITE

ROAD



Gold-Silver

Exploration for gold and silver was at the same level in 1982 as in 1981 with lode exploration concentrated in the Dawson, Mayo, Carmacks, Macmillan Pass, Whitehorse and Rancheria areas.

In the Wernecke Mountains near Delores Creek, *Texaco Canada Resources Ltd.* conducted property work on its IOTA claims (42).

Prism Resources Ltd. prospected and trenched its VERA claims (43) on Rusty Mountain, north of Mayo. Five kilometres south of the Vera deposit the company discovered a new vein.

Canada Tungsten Mining Corp. carried out an airborne electromagnetic survey and drilled 15 overburden holes on its Keno Project (44) near Keno Hill.

In the eastern Selwyn Basin northwest of Macmillan Pass, *Union Carbide Canada Ltd.* geologically mapped the ETZEL claims (45), the OLD CABIN claims (46) and the EMMY claims (47).

AGIP Canada Ltd. geologically mapped and conducted geochemical and geophysical surveys on the BRICK and NEVE claims (47).

Southwest of Macmillan Pass, *Hudson Bay Exploration and Development Co. Ltd.* carried out a program of geological mapping and rock geochemical sampling on the ROSS claims (48).

South of Ross River, *Iona Industries Inc.* conducted a geological mapping program on its KETZA-KEY property (49).

West of Carmacks, *Archer, Cathro and Associates Ltd.* drilled 637m on the LILYPAD claims (50) and conducted geological mapping and geochemical surveys on the NUCLEUS and NITRO claims (51).

On Freegold Mountain, *Arctic Red Resources Ltd.* carried out underground mine rehabilitation and drilling on its Laforma deposit (52). Further to the east on Tinta Hill (53), *Silver Tusk Mines Ltd.* and *Panther Mines Ltd.* conducted underground exploration. The companies announced in September their decision to place the property into production.

Northwest of Burwash Landing, *Archer, Cathro and Associates Ltd.* conducted geological mapping and geochemical surveys on its NARNIA claims (54).

Canadian Nickel Company Ltd. investigated the TES claims north of Whitehorse (55).

Northeast of Whitehorse, *AGIP Canada Ltd.* carried out geological mapping and geochemical programs on its GAMMON claims (56).

On Jubilee Mountain (57), southeast of Whitehorse, *Golden Slipper Resources Inc.* and *Logan Mines Ltd.* prospected, trenched and drilled five holes on their property.

Canadian Nickel Company Ltd. conducted geological mapping and rock geochemical surveys on its RAM claims (58) near Primrose Lake.

On Mount Skukum, *AGIP Canada Ltd.* carried out a program of geological mapping, geochemical and geophysical surveys and 3 325.6m of drilling in 29 holes on the KUKU, CHIEF and WOOF claims (59). Nearby the company staked the GLENLIVET claims. Also nearby, *Archer, Cathro and Associates Ltd.* conducted geological mapping and geochemical surveys on its NAIAD claims (59).

A.M.P. Exploration Ltd. and *Pure Silver Mines Ltd.* rebuilt a new access road, installed a new camp and sampled the vein on its LOGJAM property (60).

Further east of Rancheria, *Klondike Silver Mines Ltd.* explored and trenched the veins on its ANT claims (61).

North of Watson Lake, *Cima Resources Ltd.* drilled three holes on its Mt. Hundere property (62).

Copper

Despite low prices in the world copper markets, copper exploration in 1982 remained active.

Mattagami Lake Exploration Ltd. conducted geological mapping, geochemical and geophysical surveys and blasted 16 pits on its TOUCHE claims (63) in the northern Richardson Mountains.

Further south and northeast of Dawson, *Mattagami Lake Exploration Ltd.* geologically mapped the MARN, MELA and DALE claims (64).

Northwest of Carmacks, *United Keno Hill Mines Ltd.* explored the STU, HI, FIL and NOON claims (65) with 48 918m³ of bulldozer trenching.

East of Ross River, *SMD Mining Company Ltd.* carried out a program of geological mapping, geochemical and geophysical surveys on its AM claims (66).

In the Whitehorse Copper Belt, *Whitehorse Copper Mines Ltd.* drilled 2 606.7m on the NORTH STAR property (a).

East of Whitehorse and north of Teslin, the *DC Syndicate* carried out a program of geological mapping, geological and geophysical surveys on its ORK claims (67).

Northeast of Teslin, *J.C. Stephen Explorations Ltd.* on behalf of the *DC Syndicate* conducted geological mapping and geochemical surveys on the CAL claims (68).

Uranium

Uranium exploration in the Yukon in 1982 remained at the same level as in 1981 despite world oversupply of uranium and downward pressure on prices.

Archer, Cathro and Associates Ltd. worked on several claim groups in the Wernecke Mountains on behalf of the *Wernecke Joint Venture*. *Archer, Cathro* carried out geological and geochemical surveys on the PIKE (70), DEMON (70) and APE (71) claims. In addition, a geophysical survey was conducted on the PIKE claims, geological mapping only on the FLAT claims (69) and 1 044.5m of drilling in eight holes on the IGOR claims (72).

South of Dawson (73), *Eldorado Nuclear Ltd.* conducted geological mapping and geochemical surveys on its claim group.

Northwest of Macmillan Pass, *AGIP Canada Ltd.* carried out a program of geological mapping, geochemical surveys and trenching on its ICE, FIRE and SUN claims (46).

Asbestos

Archer, Cathro and Associates Ltd., on behalf of *Brinco Ltd.* and *Exploram Minerals Ltd.*, explored the TURK claims (74) near Easter Creek with two bulldozer trenches. The company also explored the TATER claims (74) on the northeastern side of Clinton Creek with two bulldozer trenches. The properties are near the former Clinton Creek asbestos mine.

Barite

Mattagami Lake Exploration Ltd. mapped in detail the barite veins on the HEIDI (76) and BANG-ON (75) claims.

In the Macmillan Pass area, *Hudson Bay Exploration and Development Company Ltd.* explored the BAR and MAC claim groups (77) with a program of geological mapping and geochemical surveys.

Nickel

Halferdahl and Associates Ltd., on behalf of the *Bur Syndicate*, conducted a geochemical survey and drilled 273m in three holes on the WEN and JO claims (78), located northwest of Kluane Lake.

Coal

Sulpetro Minerals Ltd. conducted a gravity survey on its Rock River coal licences (79).

Appendix 1

Organizational Structure and Mandate

As of January 1983, the Minister and departmental officers responsible for the administration of mines and mineral resources in the Northwest Territories and the Yukon were:

Minister:	John C. Munro
Deputy Minister:	M.A.J. Lafontaine
Assistant Deputy Minister (Northern Affairs):	G.N. Faulkner
Director General, Northern Resources and Economic Planning:	R.D. Glass
Acting Director, Mining Management and Infrastructure:	Dr. J. Lazarovich
Assistant Director, Mining Administration:	J.M. Hodgkinson
Head, Mining Resources Section: Evaluation Geologist: Technical Information Officer:	Dr. D.D. Brown T.W. Caine P.T. Marion
Head, Mining Lands Section: Head, Legislation: Head, Royalties: Administration Clerk:	T.W. Dent P.M. Corrigan M.A. Fish N. Horton
Acting Assistant Director, Mineral Policy:	J. Fraser

Acting Assistant Director,
Infrastructure: W.G. Cleghorn

Address:

Department of Indian Affairs
and Northern Development,
Les Terrasses de la Chaudière,
OTTAWA, Ontario
K1A 0H4

Phone (Mining) (819) 997-0911

Northern Affairs Program

Yukon Region

Director General:	D. Watson
Director, Mineral Resources:	C. Ogilvie
Chief Geologist:	Dr. J.A. Morin
District Geologist:	J.G. Abbott
Placer Geologist:	S. Morrison
Staff Geologists:	P.H. Watson K.J. Grapes R.L. Debicki K. Watson
Contract Geologists:	
Regional Manager, Mineral Rights:	B.R. Baxter
Mining Recorders:	D.F. Jennings, Whitehorse B. Proudfoot, Dawson R.G. Ronaghan, Mayo P. McLeod, Watson Lake
Regional Mining Engineer:	C.H. Macdonald
District Mining Engineer:	N. Prasad
Mine Rescue Superintendent:	N. Mainer
Environmental Technician:	D. Cormier
Chief Claim Inspector:	G. Gilbert
Mining Claim Inspectors:	L. Olynyk R. Whittingham

Address:

Department of Indian Affairs
and Northern Development
200 Range Road,
WHITEHORSE, Yukon
Y1A 3V1

Phone (switchboard) (403) 668-5151

Northern Affairs Program

Northwest Territories Region

Director General:	P.H. Beaubier
Director, Minerals and Economic Analysis:	G. Patenaude
Chief Geologist:	Dr. W.A. Padgham
District Geologists:	Dr. W.A. Gibbins P.J. Laporte C.C. Lord J.M. Seaton J.A. Brophy Vacant
Project Geologist:	
Archive Geologist:	
Supervising Mining Recorder:	R.L. Williams
Mining Recorders:	E.D. Cook H.B. Mercer

Address:

Department of Indian Affairs
and Northern Development,
P.O. Box 1500,
YELLOWKNIFE, Northwest Territories
X1A 2R3

Phone (Switchboard) (403) 920-8110

Department of Indian Affairs and Northern Development

The *Department of Indian Affairs and Northern Development* (DIAND) is responsible for the administration of all mines and mineral activities in the Yukon and Northwest Territories. DIAND, on behalf of the federal government, sets the policy and legislative framework which governs the mining industry in both territories.

Within DIAND's *Northern Affairs Program*, major functional groups which deal directly with the mining industry are the Northern Resources and Economic Planning Branch and the Northern Environment Branch at Headquarters, and the Regional Northern Affairs Program Branches in the Yukon Region and Northwest Territories Region.

The *Northern Resources and Economic Planning Branch* at Headquarters consist of three directorates: Northern Economic Planning, Oil and Gas Management and Major Projects and Mining Management and Infrastructure. This branch is accountable for the development of departmental strategies, policies, legislation, plans and programs related to northern economic development, including the development and management of non-renewable resources and northern economic infrastructure. In addition, the Branch has a headquarters function in the co-ordination of federal and territorial activities in the area of northern economic resource development and departmental policies and mechanisms to provide socio-economic development and benefits.

In late 1982, the *Northern Resources and Economic Planning Branch* underwent a major re-organization which resulted in the establishment of the *Mining Management and Infrastructure Directorate* integrating the former Mining Division, the Transportation and Communications Division, Northern Roads and Airstrips Division and Non-Renewable Resources Development Division. The *Mining Management and Infrastructure Directorate* brings the mining, infrastructure and mineral policy elements of the Northern Program together to give better co-ordination on issues related to mineral policy, mineral resources, mining industry development, mining legislation and infrastructure support.

The *Mining Management and Infrastructure Directorate* develops and administers federal northern mineral policy and legislation, assesses infrastructure requirements of existing and potential resource operations requiring roads, airstrips and other transportation modes, and administers mining and mineral rights. The Directorate consists of the Mining Administration Division, the Mineral Policy Division and the Infrastructure Division.

Mining Administration Division

The *Mining Administration Division* administers the royalty provisions of the Yukon Quartz Mining Act, Canada Mining Regulations and Territorial Coal Regulations. The Division recommends amendments to existing regulations after appropriate consultation with industry and regional offices of DIAND. The Mining Administration Division develops policies, assesses and drafts legislation related to the administration and disposition of mineral rights in the Yukon Territory and Northwest Territories. The Division advises various government agencies on current and proposed exploration and mining developments and maintains a microfiche library of assessment reports, geological reports and other mineral resource information.

Mineral Policy Division

The *Mineral Policy Division* plays a major role in developing policies and plans to promote the orderly management and development of mineral resources in the Yukon and Northwest Territories. In support of these activities, it conducts a wide range of studies and investigations of the economic, commercial, financial and economic aspects of mineral industry operations. Similar studies and investigations are also carried out to assess proposed major new mine developments in the Territories and to monitor existing operations. A major activity of the Division, at present, is the development of a northern mineral policy to guide mineral development in the Territories over the next decade. Although only the preliminary phases of policy development have been completed, the Minister has stated that he would like to address such issues as the role of mining in the northern economy, the involvement of native people, the provision of infrastructure, the creation of a favourable investment climate through the maintenance of an appropriate fiscal and regulatory regime and the establishment of an appropriate balance between people, minerals and the environment.

Infrastructure Division

The *Infrastructure Division* is responsible for policy, assessing, planning, programming and funding of infrastructure requirements in the North including roads, airstrips and other transportation modes within the general framework of northern development strategies, policies, plans and programs for northern economic development. The Division provides overall management for the Northern Roads Program. In addition, it manages the Northern Resource Roads Program under which the Department enters cost sharing agreements with industry for the construction of initial and permanent access roads.

Regional Offices – Yukon and Northwest Territories

The Yukon Region Branch and Northwest Territories Region Branch of the Northern Affairs Program are major functional groups which, under the direction of regional Directors General, administer the mandate of the Program within the respective Territories. Offices are located at Whitehorse, Y.T. and Yellowknife, N.W.T.

The Regional Branches have the following subunits: Mining Lands Section, Geological Services Sections and a Mining Inspection Section (in the Yukon only).

Mining Lands Sections

The Mining Lands Section in the Yukon and Northwest Territories administrative offices have been divided into seven mining districts. A mining recording staff is responsible for the disposition of mineral rights within each district in accordance with applicable legislation. There is a Supervising Mining Recorder in each Territory whose principal function is to ensure that the regulatory requirements are followed in the administration of the various mining acts and regulations.

Geological Services Sections

Geological Services Sections provide a geological service to the mineral industry in both Territories. Offices are maintained at Whitehorse and Yellowknife. Two core libraries, the H.S. Bostock Library at Whitehorse and the C.S. Lord Library at Yellowknife preserve diamond drill core.

Each core library has laboratory facilities for core splitting, diamond-saw cutting, thin section preparation and core storage. Regional and district geologists conduct mineral property examinations, collect rock and mineral specimens and advise the mineral industry, government departments and research scientists on geological and exploration matters. Department geologists assist prospectors in identifying rock and mineral specimens, by conducting prospector training courses and preparing geological compilation maps on mineralized areas.

Mining Inspection Section

In the Yukon, the Mining Inspection Section gives advice on the Mining Safety Ordinance and Mine Safety regulations of the Yukon Territory as well as the Blasting Ordinance and Regulations of the Yukon Territory.

It also prepares new safety legislation when required. A regional mining engineer is stationed at Whitehorse. This senior mining engineer has a staff consisting of a district engineer, an electrical-mechanical engineer, an environmental engineer, a mine rescue superintendent, three claim inspectors and a clerk.

The Section is responsible for the following: inspection of mines, quarries and blasting operations to ensure compliance with safety legislation; inspection of mineral claims to ensure compliance with the Yukon Quartz Mining Act and the Yukon Placer Mining Act; ensuring that sufficient mine personnel are trained in mine rescue, recovery operations and first aid; conducting ventilation and dust surveys; monitoring radioactive contamination, and carrying out environmental studies at underground and surface mining properties.

Table 6
Exploration — Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	Mattagami	WENDY	Pb, Zn
2	Mattagami	KZ	Pb, Zn
3	ZX Joint Venture/Archer, Cathro	TUDL	Pb, Zn
4	Hudson Bay	TOM	Pb, Zn, Ag, Ba
5	Ogilvie Joint Venture/Aberford	JASON	Pb, Zn, Ag, Ba
5	Cominco	NIDD	Pb, Zn
5	Cominco	HASTEN, BASIN, FETCH	Pb, Zn
5	Amax	FAN	Pb, Zn
6	Hudson Bay	FAL	Pb
6	Hudson Bay	SUN	Pb, Zn, Ba
7	Anaconda	ACE	Pb, Zn, Ba
7	Anaconda	CLARE, BUSH, EARN	Pb, Zn, Ba
8	Anaconda	KAL, BUM	Pb, Zn, Ba
9	Anaconda	RABBIT	Pb, Zn
9	Kidd Creek	SUE	Pb, Zn
10	Noranda	LADY DI	Pb, Zn, Ag
11	Cyprus Anvil	GRUM	Pb, Zn, Ag
12	Cyprus Anvil	TENAS	Pb, Zn
13	Amax/Procan	GREW	Pb, Zn
14	Hudson Bay	RAB	Pb, Zn
14	Hudson Bay	SHALE, RENO, EAGLE	Pb, Zn
15	Placer/Cygnus	Howards Pass	Pb, Zn
16	Cominco	FIN	Pb, Zn
17	Chevron	BAR	Pb, Zn, Ag, Ba
18	BRX Mining	MEISTER	Pb, Zn, Ag
18	Regional/Amax/Procan	MIDWAY	Pb, Zn, Ag
19	Regional	MR	Pb, Zn, Ag
20	Regional	LOGAN	Pb, Zn, Cu, Ag
21	Kerr Addison	GE	Pb, Zn
22	ZX Joint Venture/Archer, Cathro	AUP	Pb, Zn
22	ZX Joint Venture	CUZ	Pb, Zn
22	ZX Joint Venture	QUIVER	Pb, Zn
23	Sulpetro	JONI	Pb, Zn
23	Serem	LOOTZ	Pb

Table 6 (continued)
Exploration — Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
24	ZX Joint Venture/Archer, Cathro	QUO	Pb, Zn
25	Kidd Creek/Archer, Cathro	TRANZ	Pb, Zn
26	Kidd Creek/Archer, Cathro	MARS, RUSH	Pb, Zn
27	Canada Tungsten	Dublin Gulch (ALEC, MAR)	W
28	Canada Tungsten	CC	W, Au
29	Amax	DRILL	W
30	Union Carbide	WOLF, DAVID, PAT, BLACKIE	W, Sn
30	Amax	DOPE	W
31	Noranda	RAIL	W
32	Hudson Bay	SIM	W
33	Hudson Bay	CAB	W
33	Hudson Bay	BIG, SAM	W
34	Hudson Bay	COOT	W, Cu, Mo
35	Serem	SOURCE	W
36	Hudson Bay	TOD	W
37	Amoco/Tintina	Red Mountain (BUG)	Mo
38	Cominco	PLUTO	Mo, W
39	DC Syndicate	JC	Sn
39	DC Syndicate/J.C. Stephen	JAR	Sn, Zn
40	DC Syndicate	MUN, ROAD	Sn, W
41	DC Syndicate	FF	Sn, W
41	DC Syndicate/J.C. Stephen	ABBA	Sn
42	Texaco	IOTA	Au, Ag, Cu
43	Prism	VERA	Ag, Pb
44	Canada Tungsten	Keno Project	Ag, Pb
45	Union Carbide	ETZEL	Au
46	Union Carbide	OLD CABIN	Au
46	AGIP	ICE, FIRE, SUN	U, Cu, Mo, Au, W
47	Union Carbide	EMMY	Au
47	AGIP	BRICK, NEVE	Au, Ag
48	Hudson Bay	ROSS	Au
49	Iona	KETZA-KEY	Ag, Pb, Zn
50	Archer, Cathro	LILYPAD	Ag
51	Archer, Cathro	NUCLEUS, NITRO	Au
52	Arctic Red	Laforma	Au
53	Silver Tusk/Panther	Tinta Hill	Ag, Au, Zn, Pb, Cu
54	Archer, Cathro	NARNIA	
55	Canadian Nickel	TES	Au, Ag
56	AGIP	GAMMON	Au, Ag
57	Golden Slipper/Logan	Jubilee Mountain	Au, Ag, Cu
58	Canadian Nickel	RAM	Au, Ag

Table 6 (continued)
Exploration — Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
59	AGIP	KUKU, CHIEF, WOOF	Au, Ag
59	AGIP	GLENLIVET	
59	Archer, Cathro	NAIAD	Au
60	A.M.P./Pure Silver	LOGJAM	Ag, Pb, Zn
61	Klondike Silver	ANT	Ag, Pb
62	Cima	Mt. Hundere	Ag, Zn, Pb
63	Mattagami	TOUCHE	Cu
64	Mattagami	MARN, MELA, DALE	Cu
65	United Keno Hill	STU, HI, FIL, NOON	Cu
66	SMD Mining	AM	Cu
67	DC Syndicate	ORK	Cu
68	DC Syndicate/J.C. Stephen	CAL	Cu
69	Wernecke Joint Venture/Archer, Cathro	FLAT	U
70	Wernecke Joint Venture	PIKE, DEMON	U
71	Wernecke Joint Venture	APE	U
72	Wernecke Joint Venture	IGOR	U
73	Eldorado		U
74	Brinco/Exploram/Archer, Cathro	TURK	Asb
74	Brinco/Exploram	TATER	Asb
75	Mattagami	BANG-ON	Ba
76	Mattagami	HEIDI	Ba
77	Hudson Bay	BAR	Ba
77	Hudson Bay	MAC	Ba
78	Bur Syndicate/Halferdahl	WEN, JO	Ni
79	Sulpetro	Rock River	Coal
80		Sixty Mile River	Placer Au
81		Hunker Creek	Placer Au
81		Klondike	Placer Au
82		Sulphur Creek	Placer Au
83		Clear Creek	Placer Au
84		Burwash Creek	Placer Au
85		Livingstone Creek	Placer Au
a	Whitehorse Copper	NORTH STAR	Cu

Table 7
Exploration — Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	Westmin	Amer Lake	U
2	Urangesellschaft	Sand Lake	U
3	Uranerz	Deep Rose Lake	U
4	Urangesellschaft	LONE GULL	U
5	Inco	Sand Lake	U
6	Uranerz	Beverly Lake	U
7	Kidd Creek	Garry Lakes	U
8	Uranerz	Garry Lakes	U
9	Union Oil	Garry Lakes	U
10	Westmin	Beverly Lake	U
11	Anaconda	Mallery Lake	U
12	Urangesellschaft	Tebesjuak Lake	U
13	Urangesellschaft	Thirty Mile Lake	U
13	Comaplex	Forde Lake	U
14	Aberford	Bissett Lake	U
15	Noranda	Bissett Lake	U
16	Aberford	Yathkyed Lake	U
17	AGIP	Dubawnt Lake	U
18	AGIP	Nowleye Lake	U
19	Urangesellschaft	Kamilukuak Lake	U
20	PNC	Foster Lake	U
21	Urangesellschaft/Hudbay	Elk River	U
22	Uranerz	Power Lake	U
23	PNC	Thekulthili Lake	U
24	PNC	Thekulthili Lake	U
25	Uranerz	Fontano Lake	U
26	BP Minerals	Contact Lake	U
26	Anaconda/BP Minerals/Union Carbide	Munch lake	U
27	Petro-Canada	Kane Basin	Pb, Zn
28	Petro Canada	Bay Fiord — Strathcona Fiord	Pb, Zn
29	Cominco	Cornwallis Island	Pb, Zn
30	Nanisivik	Borden Basin	Pb, Zn
31	L. Anderson/W. Kizan	Rutledge Lake	Pb, Zn
32	E. Dean	East Arm	Pb, Zn
33	Westmin	Pine Point	Pb, Zn
34	Cominco	Hay West	Pb, Zn
35	Norando	BL, TROUT	Pb, Zn
36	Kidd Creek	Amoogabooga Lake	Pb, Zn
37	Kidd Creek	Izok Lake	Cu, Zn, Pb, Ag
38	Kidd Creek/Noranda	GONDOR	Zn, Pb, Ag
38	Kidd Creek	Central Volcanic Belt	Pb, Zn
39	Kidd Creek		Pb, Zn
40	Kidd Creek		Pb, Zn
41	Kidd Creek		Pb, Zn
42	Noranda	ICE, DELTA, SAXIFRAGE	Pb, Zn

Table 7 (continued)
Exploration — Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
42	Noranda	CANOE	
43	Noranda	ARES	
44	Cominco	KCL	Pb, Zn
44	Cominco	High Lake	Au
45	Noranda	Hope Bay	Pb, Zn
46	Cadillac	Prairie Creek	Pb, Zn, Ag, Cu
46	Procan	Prairie Creek	Pb, Zn
47	Aberford	VULCAN	Pb, Zn
48	Placer/Cygnus	Howards Pass	Pb, Zn
48	Cominco		W
48	Union Carbide		W
48	Amax		W
48	Aberford		W
49	Canadian Nickel	Misty Lake	Pb, Zn
50	Westward	Rankin Inlet	Au
51	Inco	Pork Peninsula	Au
51	Silver Chief	Maze Lake-Pistol Bay	Au
52	Esso	Kaminak Lake	Au, Pb, Zn
53	Esso	Yandle Lake	Au, Pb, Zn
54	Esso	Carnecksluck Lake	Au, Pb, Zn
55	Kognak	Otter Lake	Au
56	Suncor	Fitzpatrick Lake-Watterson Lake	Au
57	Noranda	Griffin Lake	Au
58	Giant Yellowknife	SALMITA	Au
58	Noranda	FAT-Courageous Lake	Au
59	Noranda	WIJ, INN, EDI	Au
60	Noranda	RUSS-1	Au
61	Black Ridge	Gordon Lake (MQ)	Au
61	Kengate	Gordon Lake (JIM)	Au
61	Burnt Island	Gordon Lake (GOO)	Au
62	Noranda	Russell Lake-Slemon Lake	Au
63	Noranda	Uist Lake	Au
64	Linberg and Sibbeston	South Nahanni River	Au
64	Linberg and Sibbeston	Broken Skull River	Au
65	Canadian Nickel		Au
66	Union Carbide	LENED	W
67	Amax	Mactung	W
67	Noranda	Macmillan Pass	Pb, Zn
68	Highwood/Placer	Blachford Lake	Ta, Cb, REE
68	M. Senkiw	Grace Lake	Ta, Cb, REE
69	CF Mineral	Mountain Diatrema	Diamonds
70	CF Mineral	Franklin Mountains	Diamonds

Table 7 (continued)
Exploration — Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
70	Diapros	Blackwater River	Diamonds
71	Diapros	Brodeur Peninsula	Diamonds
72	Diapros	Somerset Island	Diamonds
73	Diapros	Prince of Wales Island	Diamonds
74	Borealis	Roche Bay	Fe
75	W. Reid	Victoria Island	Fe
76	Petro-Canada	Slidre Fiord	Coal
77	Petro-Canada	Bay Fiord-Strathcona Fiord	Coal
78	DIAND	Mary River	Soapstone
79	DIAND	Pangnirtung	Soapstone
a	Canada Tungsten	Tungsten	W
a	Canada Tungsten	Baker Prospect	W
b	Pine Point	Pine Point	Pb, Zn
d	Terra	Camsell River	Ag, Pb, Zn, Cu
f	Nanisivik	Nanisivik	Pb, Zn, Ag
h	Esso	Cullaton Lake	Au
h	Suncor	Cullaton Lake	Au
i	Cominco	Little Cornwallis Island	Pb, Zn

Footnotes for Tables II and III

- (1) Table location is made with reference to corresponding numbers on Yukon and Northwest Territories Maps. Locations are approximate.
- (2) Abbreviated name of the Company is used: Expl. (Exploration), Ltd. (Limited).
- (3) Geographical areas are indicated by small print, whereas claims and groups are capitalized. Abbreviated words are: Peninsula (Pen), River (R), Lake (L).
- (4) Metal(s) of primary importance defined by chemical symbols: copper (Cu), gold (Au), lead (Pb), tantalum (Ta), lithium (Li), asbestos (Asb), molybdenum (Mo), silver (Ag), barium (Ba), cobalt (Co), tin (Sn), iron (Fe), tungsten (W), rare earth elements (REE) and uranium (U).

Table 8, Mineral Production — 1973-1982
Tableau 8, Production des Minéraux — 1973-1982

Yukon Territory — Yukon											
Mineral Minéraux	1973	1974	1975	1976	1977	1978	1979	1980	1981(R)	1982(P)	
Gold — Or g — gr	\$ 2 032 502 648 974	4 111 631 823 371	5 255 077 997 986	4 401 075 1 111 949	4 656 118 921 907	8 518 731 1 202 149	13 749 271 1 190 268	63 029 000 2 982 000	66 382 000 3 746 000	42 430 000 2 858 000	
Silver — Argent g — gr	\$ 15 342 856 188 921 678	26 800 905 180 082 381	28 531 397 196 943 109	12 809 321 92 697 630	20 154 760 127 415 268	28 462 559 143 459 000	54 218 064 129 982 000	114 120 000 147 000 000	32 339 000 80 000 000	22 141 000 70 000 000	
Lead — Plomb kg — kg	\$ 38 013 324 106 831 187	41 194 600 90 242 227	54 888 680 122 863 633	15 999 040 32 035 681	47 627 667 68 621 899	64 322 403 79 233 298	103 374 279 78 250 062	71 558 000 65 771 000	54 935 000 55 970 000	25 950 000 35 838 000	
Copper — Cuivre kg — kg	\$ 14 791 665 10 517 104	15 571 426 9 111 183	11 928 559 8 487 245	16 045 963 10 642 540	8 953 814 5 843 210	16 474 354 10 018 826	18 442 058 7 778 231	27 082 000 10 433 000	20 123 000 9 094 000	14 077 000 7 236 000	
Zinc — Zinc kg — kg	\$ 61 167 027 114 904 734	60 899 995 79 151 212	95 400 540 115 394 553	39 233 926 47 300 153	80 562 287 102 846 637	74 076 827 96 673 141	109 460 866 113 572 783	88 313 000 90 938 000	94 237 000 78 806 000	63 264 000 58 961 000	
Cadmium — Cadmium kg — kg	\$ 45 718 5 697	17 331 1 977	15 423 2 050	13 220 2 284	11 595 1 670	355 58					
Asbestos — Amiantene tonnes — tonnes	\$ 13 915 140 91 384	22 752 400 82 459	32 820 720 103 735	35 310 723 103 431	47 493 872 95 590	26 948 800 53 255					
Nickel — Nickel kg — kg	\$ 5 209 621 1 544 473										
Platinum — Platine g — gr	\$ 149 458 40 870										
Coal — Charbon tonnes — tonnes	17 782	15 447	23 326	9 046	18 779	16 578	23 003	16 529	20 860		
Total	\$ 150 667 311	171 348 288	228 840 396	123 813 268	209 460 113	218 804 029	299 244 538	364 102 000	268 016 000	167 862 000	

Source: Mineral Policy Sector, Energy, Mines and Resources and Northern Resources and Economic Planning, Indian Affairs and Northern Development.

(P) Preliminary Figures, (R) Revised Figures

Secteur des politiques minières, Énergie, Mines et Ressources et Planification des Ressources et de l'économie du Nord, Affaires indiennes et du Nord Canada
(P) chiffres provisoires (R) chiffres révisés

Table 9, Mineral Production — 1973-1982
Tableau 9, Production des Minéraux — 1973-1982

Northwest Territories — Territoires du Nord-Ouest

Mineral Minéraux	1973	1974	1975	1976	1977	1978	1979	1980	1981(R)	1982(P)
Gold - Or g - gr	\$ 24 262 894 7 747 098	28 651 414 5 737 565	28 754 047 5 460 651	24 390 081 6 162 252	31 336 428 6 204 583	45 769 718 6 458 948	61 868 488 5 355 926	96 920 000 4 209 000	85 495 000 4 825 000	103 160 000 6 949 000
Silver - Argent g - gr	\$ 13 961 789 168 591 544	17 669 851 118 728 409	8 883 385 61 319 168	14 343 774 103 794 822	18 716 934 118 325 557	23 854 173 120 237 000	34 770 651 83 358 000	41 331 000 53 000 000	13 465 000 33 000 000	1 181 000 4 000 000
Copper - Cuivre kg - kg	\$ 1 106 319 786 610	840 719 491 923	526 889 374 885	639 980 424 469	445 850 291 959	518 993 315 624	941 732 397 191	679 000 262 000	613 000 277 000	489 000 251 000
Lead - Plomb kg - kg	\$ 32 261 787 90 667 291	34 932 761 76 524 844	37 254 292 83 390 558	26 440 157 52 942 453	40 833 313 58 832 599	56 898 673 70 088 814	80 117 935 60 645 969	55 853 000 51 337 000	44 680 000 45 522 000	58 877 000 81 310 000
Zinc - Zinc kg - kg	\$ 87 541 226 164 449 732	132 251 480 171 886 138	106 650 304 129 002 037	122 438 035 147 610 457	125 104 245 159 709 355	143 911 352 187 809 913	205 600 051 213 323 454	172 556 000 175 685 000	159 764 000 133 604 000	297 900 000 277 635 000
Cadmium - Cadmium kg - kg	\$ 61 153 7 620		1 027 137	3 179 549	2 677 386					
Tungsten - Tungstène kg - kg	\$ 1 464 468	1 613 700	1 477 731	2 158 154	2 284 409	2 885 619	53 675 858 3 254 067	68 119 000 4 007 000	2 515 000	2 948 000
Tungsten and Arsenic Trioxide - Tungstène et trioxyde d'arsenic	\$								93 005 000	107 613 000
Total	\$ 159 195 167	214 346 225	182 069 944	188 255 206	216 439 447	270 952 909	436 974 715	435 458 000	397 022 000	569 220 000

Source: Mineral Policy Sector, Energy, Mines and Resources and Northern Resources and Economic Planning, Indian Affairs and Northern Development.

(P) Preliminary Figures, (R) Revised Figures

Secteur des politiques minières, Énergie, Mines et Ressources et Planification des Ressources et de l'économie du Nord, Affaires indiennes et du Nord Canada
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Miner at Shear Lake portal entrance.
Photo courtesy Cullaton Lake Gold Mines Ltd.

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Introduction

This report covers mines and mineral activities north of 60 for the calendar year 1983.

The report was written and compiled by *D.D. Brown* and *T.W. Caine* of the Mining Resources Section, Ottawa. The section on economic and policy analysis and Appendix 1 were written by J.W. Fraser, T.H. Biggs and M. St. Pierre of the Mineral Policy Division. Sections on mineral exploration were based on papers prepared by K. Grapes and J.A. Morin on the Yukon and by W.A. Padgham, W.A. Gibbins, P.J. Laporte, C.C. Lord and J.B. Seaton on the Northwest Territories.

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Executive Summary

Mineral production in the Yukon Territory during the calendar year 1983 was valued at \$59 million compared with \$169 million in 1982 and \$268 million in 1981. The drastic decline in mineral production value during 1983 resulted from the shutdown of all lode mines in Yukon during the first half of the year. The drop in mineral production value was the largest in percentage terms recorded among the provinces and territories of Canada. Gold production from Yukon placer mines accounted for \$50.5 million or 85 per cent of the total mineral production value of \$59.4 million.

Whitehorse Copper Mines Ltd. permanently closed its copper mine near Whitehorse at the end of 1982 because of ore reserve depletion. *Cyprus Anvil Mining Corporation's* Faro Mine was closed in June, 1982 and reopened in May, 1983 to commence an overburden stripping program. This program is expected to result in mill production of lead and zinc concentrate in 1985 if issues related to rail transportation and hydroelectric services are resolved. *United Keno Hill Mine's* silver operations reopened in August, 1983, at a 25 per cent reduction in production rate, after being shut down since July, 1982.

The leading sector in the Yukon mining economy was the Yukon placer gold mining industry. Gold production declared for royalty payment in 1983 increased 28 per cent to 2 932 kg of crude gold (94 275 crude troy oz.) compared with 2 290 crude kg (73 626 crude troy oz.) during the previous year. Statistics Canada reported placer gold production in 1983 for the Yukon at 3 008 kg of crude gold.

Mineral production in the Northwest Territories during the calendar year 1983 was valued at \$532 million compared with \$468 million in 1982. Despite the increase in mineral production value, the continuing economic recession and concomitant low prices for base metals and tungsten combined to make 1983 a difficult year for some mines and mining communities in the territories. Gold production remained the bright spot in the industry, with a 67 per cent increase in production value from \$91 million in 1982 to \$153 million in 1983. The value of tungsten production (WO_3) declined by \$24.6 million because of the 10-month shutdown of *Canada Tungsten's* mine.

Eight mining companies treated ore from 11 mines at 10 milling plants. Falling lead and zinc prices forced Pine Point Mines Limited to shut down on January 2, 1983. However, the mine resumed operation on June 15, 1983. Similarly, uneconomic tungsten prices forced *Canada Tungsten Mining Corporation Limited* to shut down its Cantung mine and mill operation at the end of January 1983. The mine resumed production on November 28, 1983. Gold production dropped at *Cominco's* Con Mine because of a two-month strike that lasted from mid-July to mid-September, 1983. *Giant Yellowknife Mines Limited* cut back gold ore mining production at its Yellowknife operation by 25 per cent at the end of March to extend the life of ore reserves.

Among relatively new producers, both *Echo Bay's* Lupin Mine and the *Cullaton Lake Mine* increased gold production. *Echo Bay Mines Ltd.* increased its mill capacity by 20 per cent from 900 to 1100 t per day. *Cullaton Lake Gold Mines Ltd.*, following a successful production year, plans to increase mill capacity to approximately 360 t per day in 1984 to accommodate ore production from its new Shear Lake Mine. In August, *Giant Yellowknife Mines Limited* commenced operations at the Salmita gold mine. Ore from Salmita was milled at the rehabilitated Tundra mill, 5 km to the south of the Salmita Mine. After a two-year period of limited production but intensive under-ground development and exploration, *Terra Mines Ltd.* doubled the capacity of its Camsell River silver mill from 225 to 500 t per day. In the High Arctic, operations at *Cominco's* Polaris Mine and the *Nanisivik Mine* continued successfully during the year despite low lead and zinc prices. The Polaris Mine concluded its first full year of operations by producing more concentrates than its rated capacity.

Production from the three lead-zinc mines, Pine Point, Polaris and Nanisivik, together increased 7.1 per cent for lead and 4.7 per cent for zinc compared with the previous year. This production was achieved in spite of the fact that *Pine Point Mines Limited* was closed for six months.

Mines and Mineral Activities



Aerial view of the Salmita Mine.
Photo courtesy Giant Yellowknife Mines Ltd.

Yukon Territory

Mineral Production

Mineral production in the Yukon Territory during the calendar year 1983 was valued at \$59 million compared with \$169 million in 1982 and \$268 million in 1981. The drastic decline in mineral production value during 1983 resulted from the shutdown of all lode mines in Yukon during the first half of the year. The drop in mineral production value was the largest in percentage terms recorded among the provinces and territories of Canada. Gold production from Yukon placer mines accounted for \$50.5 million or 85 per cent of the total mineral production value of \$59.4 million.

Whitehorse Copper Mines Ltd. permanently closed its copper mine near Whitehorse at the end of 1982 because of ore reserve depletion. *Cyprus Anvil Mining Corporation's* Faro Mine was closed in June, 1982 and reopened in May, 1983 to commence an overburden stripping program. This program is expected to result in mill production of lead and zinc concentrate in 1985 if issues related to rail transportation and hydroelectric services are resolved. *United Keno Hill Mine's* silver operations reopened in August, 1983, at a 25 per cent reduction in production rate, after being shut down since July, 1982.

The leading sector in the Yukon mining economy was the Yukon placer gold mining industry. Gold production declared for royalty payment in 1983 increased 28 per cent to 2 932 kg of crude gold (94 275 crude troy oz.) compared with 2 290 kg (73 626 crude troy oz.) during the previous year. Statistics Canada reported placer gold production in 1983 for the Yukon at 3 008 kg of crude gold. This figure includes gold sold to Yukon jewelry manufacturers and gold forwarded to refineries. At year's end 1983, rising zinc prices provided optimism for the recommencement of zinc and lead concentrate production at *Cyprus Anvil's* Faro Mine.



Sigma Group, Bonanza Creek (Klondike area). The pay gravel is the dark coloured Bonanza Creek gravel beside the equipment. This is overlain by White Channel Gravel tailings.

Three new small mines produced ore from high-grade silver veins. *Springmount Operating Company* produced 106.5 t of ore of its Mount Keno property (8) in the Keno Hill area and *Dawson Eldorado Gold Exploration Ltd.* produced 599 t at its PLATA property (2). In addition, *Archer, Cathro and Associates Ltd.* produced 390 t of ore from the Sadie Ladue vein in the Keno Hill area.

The Yukon accounted for 4.3 per cent of the gold, 1.6 per cent of the silver, and 0.2 per cent of the lead produced in Canada in 1983. Yukon mineral production value declined to 0.8 per cent of the value of Canada's metallic mineral production in 1983 compared with 2.45 per cent in 1982.

*numbers or letters in parantheses indicate the location of the property on the Yukon map.

At year's end 1983, the two operating lode mines, *Cyprus Anvil* (b) and *United Keno* (a) employed 372 persons compared with 1 030 persons employed at the Yukon's three operating lode mines during the first half of 1982. An estimated 750 persons were seasonally employed in placer mining operations during 1983. In addition, some 18 persons were seasonally employed in three underground placer gold mines and 40 persons were employed seasonally in exploration development and production in small-lode underground mines.

Table 1.
Mineral Production of Operating Mines,
Yukon Territory, 1982 and 1983

Company, Mine and Commodity	1983		1982	
	t	kg	t	kg
<i>Cyprus Anvil Mining Corp., Faro Mine</i>				
lead	—		33 905	
zinc	—		59 392	
silver		—		28 017
gold		—		628
<i>United Keno Hill Mines Ltd.</i>				
lead	484		9 648	
zinc	63		119	
silver		19 911		37 284
<i>Whitehorse Copper Mines Ltd.</i>				
copper	—		7 236	
silver		—		4 716
gold		—		342

Source: Department of Indian Affairs and Northern Development.

Mines

Cyprus Anvil Mining Corporation – Faro Mine

Cyprus Anvil's Faro Mine (b)* was forced to close on June 4, 1982, because low lead and zinc prices made its operation uneconomic. On May 24, 1983, the Faro Mine was reopened to commence a two-year overburden stripping program of the Faro No. 3 ore deposit. The program will involve removal of 6.6 million cubic metres of overburden. To the end of December, 1983, a total of 2.4 million cubic metres of overburden had been removed. The program will result in significantly lower production costs when the mill starts processing ore. Mill start-up is expected in 1985, depending on resolution of contracts related to rail transport and electrical power services, as the main outstanding issues. The reopening provided employment for 215 persons and the workforce will be increased substantially following recommencement of mill production.

The implementation of Cyprus Anvil's overburden removal program calls for a \$50 million dollar investment, of which half comes from the company and of the remaining \$25 million, \$19.6 million is provided by an interest-free federal government loan, and \$4.2 million from the federal government Unemployment Insurance Act (UIA) Program. The Yukon territorial government will top-up the UIA Program's contribution with \$1.2 million. In addition, the Steelworkers Union made wage and productivity concessions. When the mine closed, it was the largest private sector employer in Yukon, accounting for some 15 per cent of Yukon's labour force and 19 per cent of wage earnings.

Type:	Open pit
Location:	209 km northeast of Whitehorse
Product:	Zinc and lead concentrate
Mill Capacity:	11 000 t per day
Tonnes Milled:	Nil
Reserves:	24.5 million t (minable open pit, Dec. 31, 1981)
Reserve Grade:	2.9% lead, 4.4% zinc, 35 g silver per t
Employees:	244 (average for operating period)

United Keno Hill Mines Limited

The company resumed its silver mine and mill operation in the Elsa area (a) on July 18, 1983, after being closed on July 15, 1982, because of low metal prices and a substantial operating loss. Operations commenced at a planned production rate of 5 050 t per month compared with 7 371 t per month a year earlier. A workforce of 146 is required to support the new operating rate compared with 220 workers in 1982. Underground production was concentrated at the Husky, Elsa, Ruby and No Cash Mines, the richest mines in the Keno Hill mining camp, as well as the Silver King and Hector Fault open pit mines. The Birmingham ore stockpile also provided mill feed.

During the year overburden drilling indicated a new silver ore zone on the Silver King property and two 1.5 m-wide veins were outlined. At year's end, drilling was being conducted to define ore tonnage in the new veins.

Type:	Underground and open pit
Location:	Keno Hill area
Product:	Silver-bearing lead and zinc concentrate
Mill Capacity:	450 t per day
Tonnes Milled:	29 596
Reserves:	200 000 t (March, 1984)
Reserve Grade:	840 g silver per t
Employees:	146 (average for operating period)

Small Lode Mining Operations and Mine Development

Archer, Cathro and Associates Limited under an agreement with *United Keno Hill Mines Limited* produced 390 t of high-grade silver ore, grading 7.89 kg silver per t and 35 per cent lead, from the Sadie Ladue vein (8) in the Keno Hill area. The ore was mined by open pit and trucked to the United Keno Hill mill where the ore was milled.

In the Rogue River area, 160 km north of Faro, *Dawson Eldorado Gold Explorations Ltd.*, in a joint venture with *Silvercrest Resource Corporation*, produced 680.25 t of hand-cobbed silver ore from several veins on the PLATA property (2). The ore (599 t grading 4.25 kg silver per t and 63% lead) was airlifted to Ross River for overland transport to the smelter.

Springmount Operating Company advanced its underground workings on the old Silver Spring Mine (8), in the Keno Hill area. The company mined 25 t of high grade lead-silver ore from underground and 81.5 t of lead-silver ore from a trench on surface at its Mount Keno Mine (8).

West of Carmacks, *Arctic Red Resources Corporation* continued work on the Laforma Mine (12). Some 152 m of drifting was completed on No. 4 level, a raise was rehabilitated and diamond drilling was conducted to test for reserves below No. 4 level.



Prospecting rocker used for placer deposit evaluation.

Placer Mining

Gold production from Yukon's 260 placer mine operations increased 28 per cent in 1983 to reach 2 932 kg (94 258 troy oz) of crude or impure gold claimed for royalties compared with 2 290 kg (73 641 troy oz) in 1982. Statistics Canada reported an additional 76 kg of placer gold which was sold to Yukon jewelry manufacturers or forwarded to gold refineries in 1983.

Staking activity related to placer mining decreased during 1983. There were 2 605 new claims and 521 new leases for 1 067 km staked to December 31, 1983, compared with 3 969 new claims and 294 new leases during 1982. There were 15 060 placer claims, 416 placer leases and 12 dredging leases in good standing at year's end. It is estimated that placer mining operations employed 750 persons in 1983. This compares with 650 seasonally employed persons in 1982.

Among the larger producers, *Queenstake Resources Ltd.* produced 326.5 kg of raw gold from its dredge and sluice-box operations on Clear Creek, Black Hills Creek and Sixty Mile River, all in the Dawson area (48). This raw gold was refined to 257 kg of fine (pure) gold. The *Teck Mining Group* recovered 297.6 kg of raw gold on its Sulphur Creek operation near Dawson. Both operations involved considerable pre-development work before commencing the processing of pay dirt.

Three underground placer mines operated in 1983, two in the Klondike area (48) and one in the Sixty-mile area (49). *Jackson Hill Ventures-Universal Exploration* drove an adit into Jackson Hill (48) advancing 291 m between January and March 1983 and mined about 13 000 cubic metres. *Main Street Mining* worked underground on Dago Hill (48) between January and March, 1983, advancing 488 m. Some 7 417 cubic metres were mined. The operation started up again in November, 1983. *Chumar Placers* operated its Miller Creek Mine (49) from January to April 13, 1983, and mined approximately 1 200 cubic metres of frozen gravel. The company resumed mining on October 6, 1983.



Queenstake Resource's dredge, Clear Creek (115P).

Outlook

Prospects for 1984 remain uncertain as improved zinc, lead, tungsten, and silver prices are required to bring full recovery and renewed growth to the lode mine industry. Beyond the prospect of future capacity production of zinc and lead concentrate at *Cyprus Anvil's* Faro Mine, the most important large scale project on the horizon is the development of *Amax of Canada Limited's* Mactung Mine. This \$171 million mine and mill project on the NWT-Yukon border could be on stream by late 1986 or 1987, at an initial scale which will depend on world tungsten prices and demand. Technical and engineering studies are continuing. A production decision could be made in 1984 if tungsten markets show sufficient signs of recovery.

The issue of the federal government's draft (proposed) Yukon Placer Mining Guidelines, governing water use in Yukon placer mining operations is expected to be resolved in 1984. The draft guidelines were reviewed at public hearings held at five Yukon communities between Sept. 7 and Nov. 8, 1983. The report of the Public Review Committee on Yukon Placer Mining Guidelines was submitted to the Minister of Indian and Northern Affairs, Minister of Fisheries and Oceans and Minister of the Environment in January, 1984, for their consideration in the development of an appropriate regulatory regime.

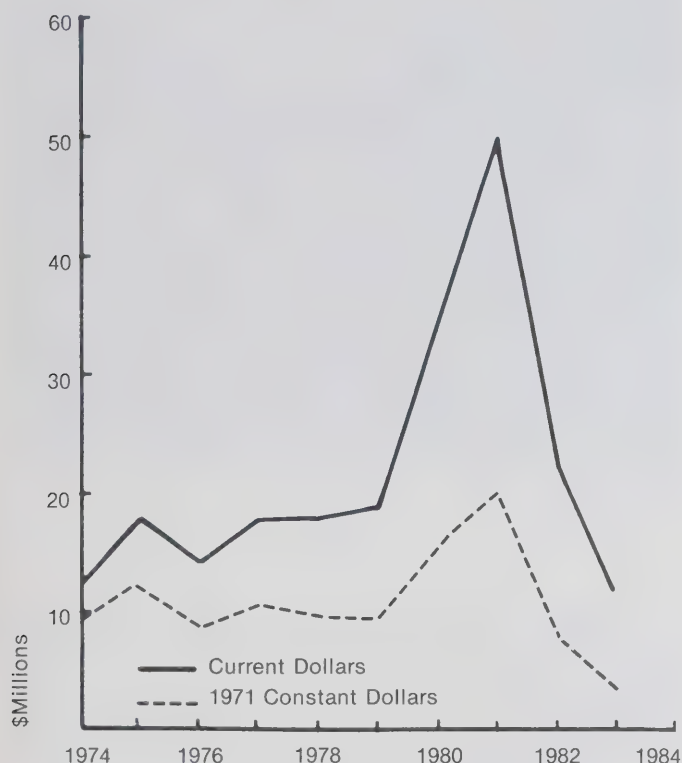
Mineral Exploration

Mineral exploration expenditures continued to decline during 1983 to an estimated \$11 million compared with \$22 million in 1982 and \$50 million in 1981. The year was characterized by low levels of property work. The most active areas were in the Wheaton River area, south of Whitehorse, for gold-silver deposits, and in the Rancheria area, west of Watson Lake, for shale-hosted silver-lead-zinc deposits.

Table 2.
Quartz Claims Recorded in Yukon, 1982 and 1983

District	1983 Claims Recorded	1982 Claims Recorded
Whitehorse	1 675	981
Dawson	977	538
Mayo	540	408
Watson Lake	1 418	1 852
Total	4 610	3 779

Figure 1
Mineral Exploration Expenditures
Yukon Territory



Claim Staking

Mineral (quartz) claims staked and recorded during the year with comparative figures for 1982 as given in Table 2.

The total quartz claims in good standing at year's end 1983 was 47 094, down from 52 634 at year's end 1982.

During 1983, 68 properties were explored, of which 25 were explored for precious metals, 22 for lead and zinc, 13 for molybdenum, 10 for tungsten and four for copper.

A list of exploration companies active in the Yukon Territory during 1983 is given in Table 8 and locations of those activities are shown by corresponding numbers on the Yukon map.

Exploration Projects

Gold and Silver

Silver-lead-zinc exploration was particularly active in the Rancheria area, north of the MIDWAY shale hosted silver-lead-zinc deposit, which is located across the territorial boundary in northern British Columbia.

Butler Mountain Minerals Corporation conducted a diamond drill program on the YP property (29). Six holes were drilled and intersected thin stringers of pyrite, galena and sphalerite mineralization in quartz porphyry breccia. Nearby, *Getty Minerals Ltd.* drilled and trenched high grade silver-zinc-lead occurrences on the MEISTER claims (20). *Getty Minerals* also optioned the MR claims (20) from *Regional Resources Ltd.*, which cover stratiform silver-lead-zinc mineralization. Getty drilled, trenched and carried out geological, geochemical and geophysical surveys. *Beaver Resources Inc.* conducted geochemical and geophysical surveys on the WIND claims (29). *Hardy International Developments Inc.* drilled a mineralized area on the JACK claims (29). The first hole is reported to have intersected 6 m of disseminated galena and sphalerite.

In the Wheaton River area, *AGIP Canada Ltd.* continued work on its Mount Skukum property, KUKU and CHIEF claims (15). Property work included diamond drilling of 40 holes for a total of 4 545 m, geological mapping, rock geochemical sampling and bulldozing of trenches. Precious metal mineralization is associated with fissure-filled veins hosted in volcanic rocks of Late Cretaceous and Early Cenozoic age. Nearby, *AGIP* conducted exploration work on the GLENLIVET (15) and LATER claims (14).

To the east of Tally-Ho Mountain (16), *Tally-Ho Exploration* investigated an epithermal vein that had been mined for precious metals in the early 1900's. In the Mount Stevens area, near the Wheaton River, *Canadian Nickel Company Limited* staked the TON claims (16) as a follow-up to the geochemical anomalies generated in its 1974-75 reconnaissance programs.

East of Tagish Lake, on the northeast side of Jubilee Mountain (17), *Logan Mines Ltd.* trenched and sampled a gold-silver-copper showing in a limonitic shear zone in Cretaceous volcanic rocks.

South of Macmillan Pass, *Trident Resources Inc.* sampled quartz stringers and narrow zones of silicification in black argillite on the SEL claims (6) for silver and gold. Near the North Canol Road, *AGIP Canada Ltd.* continued exploration for precious metals in South Fork volcanic rocks. The RAGS and WENDY claims (7) were mapped and both soil and rock were geochemically sampled. Twenty-five km northeast of these claims, near Dragon Lake, *Canamax Resources Inc.* conducted a geological and soil geochemical program on the NURF claims (7). The claims cover minor gold and silver-bearing pyroxene-pyrrhotite pods and quartz-arsenopyrite veins in Hadrynian marble.



Processing plant used by B. and J. Johnson, Gay Gulch (Klondike area).

To the northwest of Macmillan Pass, *AGIP Canada Ltd.* staked and explored the DALL claims (3), covering an area underlain by Lower Earm Group clastics cut by a small Cretaceous intrusion. To the east of the DALL claims, the LEAF claims (3) were staked to cover Road River Group sedimentary rocks intruded by a Cretaceous stock. Both properties were mapped and soil and rock geochemical surveys were conducted.

To the east of the LEAF claims, the BRICK and NEVE claims (23), covering quartz-realgar-stibnite veinlets in acidic sills, were mapped and exploration work was conducted by *AGIP Canada Ltd.*

The WALL claims (5), near the Yukon-NWT border, north of Macmillan Pass, covering Hadrynian Grit Unit sedimentary rocks intruded by a Cretaceous granitic stock, were mapped and both soil and rocks were geochemically sampled by *AGIP Canada Ltd.*

Forty-five km northwest of Macmillan Pass, *Canamax Resources Inc.* conducted geological and geochemical surveys on the NUT claims (4). The claims cover a small quartz monzonite stock intruded into Paleozoic argillite, calcareous argillite and limestone. Galena and sulphosalt-bearing veins in brecciated and occasionally bleached hornfels partially ring the intrusion.

AGIP Canada's FIRE, ICE and SUN claims, located 75 km northwest of Macmillan Pass (3), were worked on by *Cominco Ltd.* Bismuthinite and arsenopyrite with associated gold occur as joint or fracture fillings in a syenite intrusion.

Southwest of Carmacks, *Kerr Addison Mines Limited* carried out a reconnaissance geology and geochemistry program over an area of felsic volcanic rocks on the HIK claims (52).

On Prospector Mountain, northwest of Carmacks, *Archer, Cathro and Associates Limited* continued exploration on the LILYPAD (11) and NUCLEUS (42) claims.

Canadian Nickel Company Limited explored two quartz-chalcedony vein structures on the RAIN claims (10) located northwest of Carmacks. The veins occur in Mesozoic granitic rocks, basement rocks and nearby Late Cretaceous Carmack Group volcanic rocks. Both zones contain anomalous gold, arsenic, mercury and barium values.

Further west, *Kerr Addison Mines Limited* explored the KOE claims (50) with a reconnaissance geology and geochemistry program. In the same area,

Tombill Mines Limited worked on the Hayes property (50) where quartz veins with gold and base metal values occur in shear zones peripheral to a central rhyolite porphyry plug.

In the Klondike area, *Dawson Eldorado Gold Explorations Ltd.* in a joint venture with *Archer, Cathro and Associates Limited* mapped and sampled the LONE STAR gold property (9) and reopened the old adit. Eleven new claim groups were staked in the area. These were geologically mapped and soil sampled. The BRONSON claims (9) owned by *Cominco Ltd.* were mapped and geochemically sampled.

The *Dawson Syndicate* conducted geochemical and geophysical surveys on the SYNDICATE, DAWSON, WILLIAM and other claims, west of Dawson (51). Several areas anomalous in gold were outlined.

In the Keno Hill area, *Island Mining and Explorations Co. Ltd.* conducted a magnetometer survey and a seven hole drill program totalling 1 450 m on its MAG claims (8).

In the northern Yukon, *Rio Alto Exploration Ltd.* in joint participation with *E and B Explorations Ltd.* and *Kenton Natural Resources Ltd.* completed a 427 m long airstrip on the Rusty Springs silver-lead-copper vein property (1). A nine-km VLF-EM survey was conducted and two diamond drill holes were completed, totalling 488 m.



Vibrating "grizzly" at the processing plant used by B. and J. Johnson, Gay Gulch (Klondike area).

Zinc - Lead

North of Watson Lake, *Kerr Addison Mines Limited* drilled five holes and carried out a geophysical survey on its GE claims (53). In the Hoole River area, southeast of Ross River, *Canamax Resources Inc.* mapped and soil sampled the ZOO and ZAP claims (26). The claims cover disseminated to laminated sphalerite and galena in barite lenses within a Mississippian fragmental volcanic unit.

North of Teslin, *Cambac Resources Ltd.* conducted geochemical and VLF-EM and pulse-EM surveys on the BAR property (27). Stratiform lead, zinc, silver and barite mineralization is hosted in Upper Paleozoic shale and chert.

Southeast of Ross River, *Hudson Bay Exploration and Development Co. Ltd.* conducted an overburden drill program on its Pelly Banks property (25) to test EM conductors. The company had previously intersected very narrow bands of galena-sphalerite in one hole in this area.

In the Clear Lake area, *Cominco Ltd.* drilled one hole totalling 149 m on its TUM property (22). In the same area, *Getty Minerals Ltd.* continued work on its Clear Lake property (22) where three drill holes drilled in 1982 intersected numerous zones with pyrite, sphalerite and occasional galena hosted in shale and volcanic rocks.

At Macmillan Pass, *Cominco Ltd.* continued work on the HASTEN, BASIN and FETCH claims (24) where one hole of 302 m was drilled in the HASTEN claims. Some 16 km to the northwest on the NIDD claims (24), minor sphalerite and galena mineralization occurs in sedimentary rocks of the Road River Formation and Earn Group. *Cominco* conducted geochemical, magnetometer and Max-Min EM surveys and diamond drilled five holes totalling 106 m. Near the North Canol Road, *Hudson Bay Mining and Smelting Co. Limited* completed two large trenches on its TOM zinc-lead-silver property (24).

In the Wernecke Mountains, 115 km northeast of Mayo, *Acheron Resources Limited* geologically mapped, collected soil samples and trenched on the BUD and DAGO claims (21) for zinc-silver-lead mineralization.

MAP-1
YUKON
MINERAL EXPLORATION AND
MINING - 1983

LEGEND



Producing Hardrock Mine

- a United Keno Hill Mines Ltd., Ag, Pb, Zn, Cd
b Cyprus Anvil Mining Corp. Ltd., Pb, Zn, Ag

(21) Areas of Mineral Exploration Activity
Refer to Yukon Table and Text



LEAD-ZINC-SILVER



TUNGSTEN, TIN, MOLYBDENUM



COPPER, NICKEL

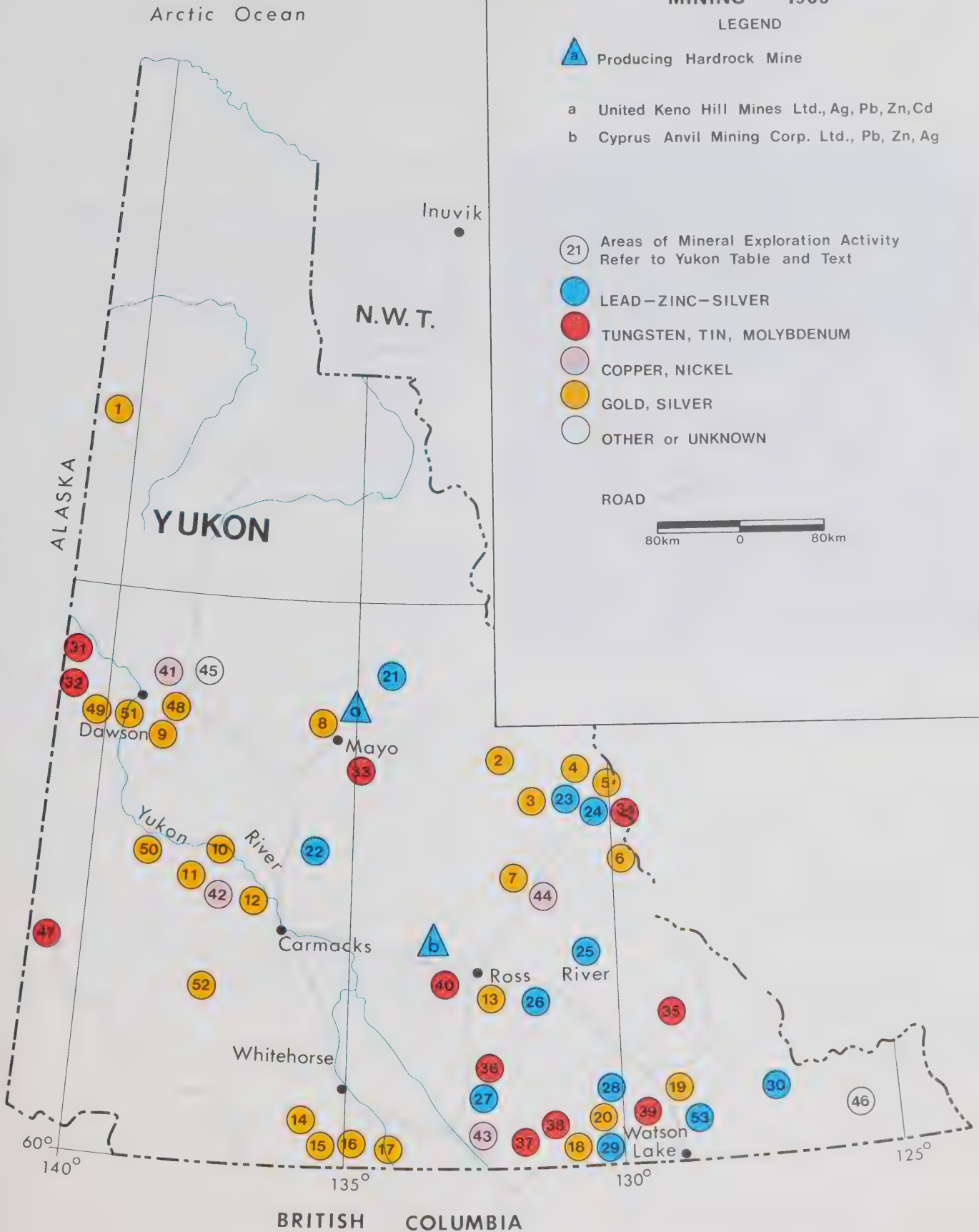


GOLD, SILVER



OTHER or UNKNOWN

ROAD





Processing plant used by Punters Gold Exploration, Clear Creek (115P).

Tungsten - Tin

In the Rancheria area, *Canamax Resources Inc.* worked on the HOT claims (39) which cover a hornfels and skarn zone. Two holes totalling 576 m were drilled and the holes intersected scheelite and molybdenite mineralization. To the northwest, *Archer, Cathro and Associates Limited* conducted a magnetometer survey and trenched on the OBVIOUS claims (40). Irregular and discontinuous skarns with an average grade of about 0.4 per cent WO_3 occur in near the Nisutlin Batholith.

East of Francis Lake, *A and M Exploration Ltd.* explored the RIETTA claims (35), which contain tungsten-bearing skarns along the contact of a quartz monzonite intrusion.

East of the North Canol Road, in the Otter Creek area, *Canamax Resources Inc.* conducted a geological and geochemical survey of the NARL claims (44), where weak soil anomalies of base metals, silver and tungsten occur over hornfels zones.

Southeast of Mayo on Kalzas Mountain, *Union Carbide Exploration Company Ltd.* drilled 668 m on its WOLF, DAVID, PAT and BLACKIE claims (33). Wolframite occurs in a quartz vein swarm and quartz-stockwork in Grit Unit rocks.

In the Rancheria area, *Du Pont Canada Exploration Ltd.* conducted a detailed magnetometer survey over the MC (SWIFT), SLIP (37) and VAL A claims (38). The VAL A claims were trenched to expose cassiterite in skarns along the contact with the Seagull Batholith. Northeast of Teslin Lake, *D.C. Syndicate* conducted geological, IP, pulse EM and trenching programs on the ORK claims (36), to define tin-copper-silver mineralization in skarn and disseminated sulphides in altered quartzite.

Northwest Territories

Mineral Production

Mineral production in the Northwest Territories during the calendar year 1983 was valued at \$532 million compared with \$468 million in 1982. Despite the increase in mineral production value, the continuing economic recession and concomitant low prices for base metals and tungsten combined to make 1983 a difficult year for some mines and mining communities in the territories. Gold production remained the bright spot in the industry, with a 67 per cent increase in production value from \$91 million in 1982 to \$153 million in 1983. The value of tungsten production (WO_3) declined by \$24.6 million because of the 10-month shutdown of *Canada Tungsten's* mine.

Eight mining companies treated ore from 11 mines at 10 milling plants. Falling lead and zinc prices forced *Pine Point Mines Limited* to shut down on January 2, 1983. However, the mine resumed operation on June 15, 1983. Similarly, uneconomic tungsten prices forced *Canada Tungsten Mining Corporation Limited* to shut down its Cantung mine and mill operation at the end of January 1983. The mine resumed production on November 28, 1983. Gold production dropped at *Cominco's* Con Mine because of a two-month strike that lasted from mid-July to mid-September, 1983. *Giant Yellowknife Mines Limited* cut back gold ore mining production at its Yellowknife operation by 25 per cent at the end of March to extend the life of ore reserves.

Among relatively new producers, both *Echo Bay's* Lupin Mine and the Cullaton Lake Mine increased gold production. *Echo Bay Mines Ltd.* increased its mill capacity by 20 per cent from 900 to 1100 t per day. *Cullaton Lake Gold Mines Ltd.*, following a successful production year, plans to increase mill capacity to approximately 360 t per day in 1984 to accommodate ore production from its new Shear Lake Mine. In August, *Giant Yellowknife Mines Limited* commenced operations at the Salmita gold mine. Ore from Salmita was milled at the rehabilitated Tundra mill, 5 km to the south of the Salmita Mine. After a two-year period of limited production but intensive underground development and exploration, *Terra Mines Ltd.* doubled the capacity of its Camsell River silver mill from 225 to 500 t per day. In the High Arctic, operations at *Cominco's* Polaris Mine and the *Nanisivik* Mine continued successfully during the year despite low lead and zinc prices. The Polaris Mine concluded its first full year of operations by producing more concentrates than its rated capacity.

Production from the three lead-zinc mines, Pine Point, Polaris and Nanisivik, together increased 7.1 per cent for lead and 4.7 per cent for zinc compared with the previous year. This production was achieved in spite of the fact that *Pine Point Mines Limited* was closed for six months.

The mineral industry of the Northwest Territories accounted for 96.9 per cent of the tungsten, 26.5 per cent of the lead, 23 per cent of the zinc, 12.9 per cent of the gold and 4.6 per cent of the silver produced in Canada during 1983. The production value accounted for 6.5 per cent of the value of Canada's metallic mineral production compared with 5.6 per cent in 1982.

Operating mines and mills in the Northwest Territories employed 2,369 persons at the end of December, 1983. Of the 765 employees laid off by the closing of the Pine Point Mine and the Canada Tungsten Mine, some 662 were re-employed when the mines reopened later in the year.

Development

At year end 1983, *Cullaton Lake Gold Mines Ltd.* ; moved forward with preproduction development of the Shear Lake gold mine located some 5 km north of the Cullaton Lake Mine. A decline was driven through seven gold-bearing zones and drifts were extended from the decline toward the main shear zone, which is the new production target zone.

At *Cominco's* Ptarmigan Mine, 20 km by road northeast of Yellowknife, ramping, drifting and bulk sampling were conducted. Despite encouraging results, a production decision was postponed because the Con mill was operating at capacity to process ore from the Con Mine.

Cadillac Explorations Limited's base metal-silver property, at Prairie Creek, on which a mine and mill construction was near completion during 1981, was placed on hold in mid-1982 without achieving initial production. At year end 1983, no new developments which would bring the mine into production during 1984 were apparent.

By July 1983, *Terra Mines Limited* completed 610 m of decline, raise and lateral development on its Bullmoose (TA) gold property, 80 km southeast of Yellowknife. Some 1 525 m of underground drilling on the No. 4 vein increased reserves to 630 000 t grading 10.6 g gold per t compared with previous reserves of 22 575 t grading 10.57 g gold per t. The company hopes to prove sufficient reserves to bring the property into production. Overall costs of 1983 exploration-development at Bullmoose amounted to approximately \$3 million.

Mines

Canada Tungsten Mining Corporation Limited

Canada Tungsten Mining Corporation's Cantung Mine (a)* produced 1 491 t of tungsten trioxide (WO₃) contained in concentrate compared with 2 925 t of tungsten trioxide (WO₃) in 1982. On January 22, 1983, mine production was suspended because of a sharp drop in tungsten prices during 1982 and mounting inventories. On November 28, 1983, the mine and mill resumed operation at a reduced throughput of 450 t per day or about one-half of full mill capacity. Tungsten prices remained low and fluctuating at year's end. However, reduced world tungsten inventories and market signals indicated some anticipated resurgence in tungsten demand. In December 1983, 145 mine workers were employed at the mine compared with a previous mine work force of 246 in 1982.

During the period when the mill was shut down, the company kept part of the mine work force employed in underground development and exploration.

Type:	Underground
Location:	Tungsten
Product:	Tungsten in scheelite concentrate
Mill Capacity:	1 000 t per day
Tonnes Milled:	36 001
Reserves:	2.72 million t (Dec. 31, 1983)
Reserve Grade:	1.32% tungsten trioxide
Employees:	147 (average for operating period)

*numbers of letters in parentheses indicate the location of the property on map in centerfold.

Cominco Limited – Con Mine

Cominco Ltd.'s Con Mine (c) ceased mine production during a strike that lasted from July 14 to September 16, 1983. Wages, holidays and taxation of northern benefits were the main issues. Because of the strike, the tonnage of ore milled decreased to 189 800 t in 1983 compared with 212 400 t during 1982. The mine produced 2 193 kg of gold (70 500 troy oz).

A decision was made to deepen the Robertson Shaft by 247 m to 1 900 m to provide four more working levels and the opportunity to explore at greater depth. The \$9 million project is scheduled for completion in 1985.

Type:	Underground
Location:	1.4 km south of Yellowknife
Product:	Gold, silver
Mill Capacity:	550 t per day
Tonnes Milled:	189 800
Reserves:	1.7 million t (Dec. 31, 1983)
Reserve Grade:	15.1 g gold per t
Employees:	307 (average for year)

Cominco Limited – Pine Point Mine

Pine Point Mines Limited (b), controlled by Cominco Ltd., shut down its Pine Point mining and milling operation from January 2 to June 15, 1983. The closure resulted from depressed zinc and lead prices and high operating costs, which made operations uneconomic. The mine reopened after the company received wage concessions from the mine workers union, a rail rate reduction from CN Rail (Canadian National Railways) and lower smelter treatment charges. In addition, the federal government provided assistance under Section 38 of the Unemployment Insurance Act (UIA) Program and the territorial government provided a top up to the UIA Program funding. Also, Northern Canada Power Commission reduced electrical power costs to the mine. Pre-development work to remove overburden from a new open-pit mine containing high-grade ore was funded in part by the government contributions. By early 1984 most of the government assistance had been discontinued. In December 1983, 545 persons were employed at the mine.

Rising mining costs and lower metal prices necessitated the removal of uneconomic ore from reserves. The company increased its average reserve grade from 2.4 per cent lead and 6.1 per cent zinc in 1982 to 2.7 per cent lead and 6.3 per cent zinc in 1983, thereby removing 7.1 million t from its reserves.

Type:	Open pit
Location:	Pine Point
Product:	Lead, zinc
Mill Capacity:	10 000 t per day
Tonnes Milled:	893 329
Reserves:	23.6 million t (Dec. 31, 1983)
Reserve Grade:	2.7% lead and 6.3% zinc
Employees:	535 (average for operating period)

Cominco Limited – Polaris Mine

Cominco's Polaris zinc-lead mine (i) on Little Cornwallis Island concluded its first full year of operation. Concentrate containing 119 627 t of zinc and 35 558 t of lead was produced in 1983 compared with 64 773 t of zinc and 25 310 t of lead during the previous year. Production was 217 100 t of zinc concentrate and 51 100 t of lead concentrate, well in excess of design capacity of the mill. Mill throughput increased to 829 000 t in 1983 compared with 469 700 t in 1982. Nine shipments were made to Europe during the shipping season from August to late October, totalling 183 500 t of zinc concentrate and 41 400 t of lead concentrate.

Type:	Underground
Location:	100 km northwest of Resolute
Product:	Zinc, lead
Mill Capacity:	2 100 t per day
Tonnes Milled:	829 000
Reserves:	16.9 million t (Dec. 31, 1983)
Reserve Grade:	4.1% lead, 14.8% zinc
Employees:	220 (average for year)

Table 3
Mineral Production of Operating Mines,
Northwest Territories, 1982 and 1983

Company, Mine and Commodity	1983		1982	
	t	kg	t	kg
<i>Canada Tungsten Mining Corp. Ltd.</i> tungsten trioxide	1 491		2 925	
<i>Cominco Ltd.</i> Con Mine gold		2 193		2 471
silver		460		603
arsenic trioxide	250		—	
<i>Pine Point Mine</i> zinc	67 643		8 981	
lead	23 203		69 037	
<i>Polaris Mine</i> zinc	119 627		64 773	
lead	35 358		25 310	
<i>Cullaton Lake Gold Mines Ltd.</i> gold		1 147		788
silver		24		373
<i>Echo Bay Mines Ltd.</i> Lupin Mine gold		3 670		34
silver		287		—
<i>Giant Yellowknife Mines Ltd.</i> Giant Mine gold		1 944		2 258
silver		552		452
arsenic trioxide	732		1 780	
<i>Salmita Mine</i> gold		165		—
silver		32		—
<i>Nanisivik Mines Ltd.</i> zinc	61 042		70 938	
lead	6 396		13 947	
silver		26 225		30 160
<i>Terra Mines Ltd.</i> silver		45 539		26 717
copper	115		9.5	
lead	181		—	
zinc	118		—	

Sources: Department of Indian Affairs and Northern Development and the Government of the Northwest Territories.

Cullaton Lake Gold Mines Limited

The Cullaton Lake Mine (h) of Cullaton Lake Gold Mines Limited officially reached full production on January 1, 1983. The mine commenced gold production in October 1981, but operational problems prevented the mill from attaining design mill capacity. In mid-1982 Camchib Resources Inc. was brought in to manage the project and the operational difficulties were resolved. In 1983, 102 035 t of ore were milled compared with 66 123 t in 1982. Gold production in 1983 was 1 147 kg (36 878 troy oz) compared with 788 kg (25 335 troy oz) in 1982.

Toward year's end, the company was progressing on preproduction development of its Shear Lake gold deposit, located 5 km north of the Cullaton Lake Mine. A 427 metre-long decline was driven through seven new gold-bearing zones and drifts were extended from the decline toward the main shear zone, which is the production target. With the development of the new Shear Lake Mine exceeding expectations, the company plans to increase mill capacity at the Cullaton Lake mill to about 360 t per day in 1984 at a cost of \$2 million. The net result should be an increase in gold production to approximately 1 866 kg (60 000 troy oz) annually.

Ore reserves at Shear Lake are estimated at more than 900 000 t to the 183 m horizon, at grades equal to that of the Cullaton Lake Mine. If reserves can be further increased the company may decide by the end of 1984 to expand the mill to a capacity in excess of 450 t per day.

Type:	Underground
Location:	Cullaton Lake, Keewatin District
Product:	Gold, silver
Mill Capacity:	300 t per day
Tonnes Milled:	98 553
Reserves:	154 221 t (October 1, 1983, not including Shear Lake)
Reserve Grade:	17.1 g gold per t
Employees:	148 (average for year)

Echo Bay Mines Ltd. – Lupin Mine

Successful operations at the Lupin gold mine (g) during its first full year of production prompted Echo Bay Mines Ltd. to increase its mill capacity by 20 per cent from 900 to 1100 t per day. The decision to expand mill capacity was based on an upward revision of ore reserve estimates to 3.08 million t grading 13.6 g gold per t. The mine recorded full sustained production capacity in October 1982. In February 1983, the company completed a 600 km winter road from Yellowknife to the mine site for winter resupply.

Mill throughput during 1983 reached 331 218 t compared with 199 251 t during the previous year. Production in 1983 amounted to 3 670 kg of gold (118 000 troy oz) compared with 34 kg (1 093 troy oz) in 1982.

Type:	Underground
Location:	400 km northeast of Yellowknife
Product:	Gold, silver
Mill Capacity:	1 000 t per day
Tonnes Milled:	331 218
Reserves:	3 084 000 t
Reserve Grade:	13.6 g gold per t
Employees:	340 (average for year)

Giant Yellowknife Mines Limited – Giant Mine

Giant Yellowknife Mines Limited produced 1 944 kg of gold (62 505 troy oz) in 1983 compared with 2 258 kg (72 597 troy oz) in the previous year at its Giant Mine (c). The decline in gold production resulted from a planned reduction in mill throughput tonnage of 25 per cent beginning in

the second quarter of 1983. The cutback, designed to extend the life of ore reserves, was achieved by cutting back on the underground tonnage mined, operating on a five-day milling week and reducing the workforce through attrition, early retirement and reduction of the work force to 280 employees from 315. Ore grades were decreased to 7.89 g of gold per t in 1983 compared with 8.23 g per t in 1982. Ore reserves were increased by 424 000 t. Most of the new ore was defined through underground development and drilling of known mineralized zones.

Type:	Underground and open pit
Location:	2.4 km north of Yellowknife
Product:	Gold, silver
Mill Capacity:	1 000 t per day
Tonnes Milled:	296 650
Reserves:	1 016 047 t (Dec. 31, 1983)
Reserve Grade:	7.89 g gold per t
Employees:	292 (average over year)

Giant Yellowknife Mines Limited – Salmita Mine

Giant Yellowknife Mines Limited commenced mill production at its Salmita Mine (e) in August, 1983, and the mine was officially opened in December, 1983. Mine development included driving a decline to the 250 m level and exploration drilling below the 250 m level. The mill of a former gold producer, Tundra Gold Mines Ltd., located 5 km to the south of the Salmita Mine, was purchased and rehabilitated to provide 150 t per day of mill capacity. Much of the equipment and supplies to the mine were hauled over a winter ice road from Yellowknife. The gold concentrate from the Tundra mill is shipped to the Giant Mine plant at Yellowknife for refining. The project cost amounted to \$11.1 million, well under the projected development cost of \$13.9 million. Ore treated in 1983 during the tune-up phase yielded 165 kg of gold (5 116 troy oz).

Twelve underground exploration holes drilled below the fourth level (205 m below surface), established the continuation of the quartz vein to the eighth level (365 m depth). Four holes were also drilled to test the 'T' vein, a parallel structure to the main vein, with some encouraging results.

Reserves are sufficient to produce 1 244 kg of gold (40 000 troy oz) per year over 2.5 years.

Type:	Underground
Location:	250 km northeast of Yellowknife
Product:	Gold, silver
Mill Capacity:	150 t per day
Tonnes Milled:	11 926
Reserves:	105 233 t (Dec. 31, 1983)
Reserve Grade:	28.11 g gold per t
Employees:	84 (average for year)

Nanisivik Mines Ltd.

Nanisivik Mines Ltd. (f) milled 615 561 t of zinc-lead-silver ore in 1983 compared with 633 628 t in 1982. Concentrate production contained 6 396 t of lead, 61 042 t of zinc and 26 225 kg of silver. In the fall of 1982, the company was forced to store a shipload of concentrate at the mine because the last ship failed to reach the mine before ice blocked the passage. As a result, concentrate shipments to Europe during the 1983 shipping season reached a record 127 000 t compared with 102 000 t in 1982.

Type:	Underground
Location:	Arctic Bay, Baffin Island
Product:	Zinc, lead, silver
Mill Capacity:	1 800 t per day
Tonnes Milled:	615 561
Reserves:	4.4 million t (Jan. 31, 1983)
Reserve Grade:	10.5% zinc, 0.8% lead
Employees:	190 (average for year)



Trommel recovery plant, Barlow Creek (115P) Yukon.

Terra Mines Ltd.

Terra Mines Ltd. milled 45 287 t of ore at its Silver Bear mill in the Camsell River area (d) compared to 36 100 t in 1982. In late 1982, the Smallwood and Norex mines joined the Silver Bear Mine in supplying ore to the Silver Bear mill. In November, 1983, the company increased mill capacity from 225 t per day to 500 t per day at a cost of \$750 000. During 1982 and 1983 extensive underground exploration and development work was conducted to prepare ore reserves for mining.

Type:	Underground
Location:	15 km south of Great Bear Lake on the Camsell River
Product:	Silver, copper, lead, zinc
Mill Capacity:	500 t per day
Tonnes Milled:	45 287
Reserves:	not available
Employees:	116 (average for year)

Outlook

Exploration and development expenditures in the Northwest Territories declined marginally in 1983 to an estimated \$18 million from \$22 million in the previous year. The level of exploration expenditures in 1984 will remain approximately the same. The shift from base metal and uranium exploration to gold exploration and development continued. The establishment of the Salmita gold mine (e) as a new producer in 1983, was followed by *Cullaton Lake* Mine's decision to bring its Shear Lake gold mine (h) into production in 1984 to augment gold output. Exploration and development work on *Terra Mine's* Bullmoose (26) gold property has been encouraging and a production decision may be forthcoming in 1984. Positive signals in the gold mining sector are the successful 1983 operations at relatively new mines, namely *Echo Bay's* Lupin and *Cullaton Lake's* B-Zone gold mines, and the continuing operation of the Con and Giant mines, at Yellowknife. In the longer term, *Amax of Canada Limited* is expected to bring its Mactung tungsten mine (17) on the NWT-Yukon border into production, perhaps during 1986 or 1987. The strengthening of zinc prices and marginal improvement in tungsten prices during the second half of 1983 indicated some metal market recovery, although general commodity market uncertainty continues.

Mineral Exploration

Mineral exploration expenditures continued to decline in 1983 to an estimated \$18 million compared with approximately \$22 million in 1982. Expenditures on gold exploration and gold property development amounted to about half of the total expenditure. Some \$4 million was expended on exploration for base metals in the Pine Point District and near the Nanisivik Mine in northern Baffin Island. Expenditures on uranium exploration continued to decline and probably amounted to about \$4 million.

In 1983, there were more gold exploration and development projects (53) than base metals projects (19) and uranium projects (25) combined (Table 4). Of a total of 115 properties explored, 44 took place in Slave geological province, in northeast Mackenzie District. Of these 44 projects, 40 were directed to gold exploration in Archean Yellowknife Supergroup rocks.

Figure 2
Mineral Exploration Expenditures
Northwest Territories

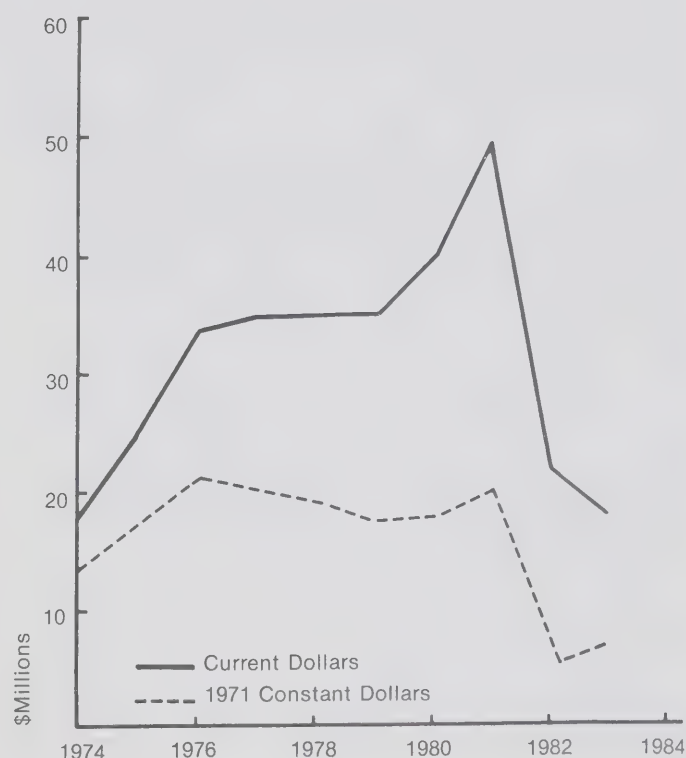


Table 4.
Exploration By Commodity,
Northwest Territories, 1983

Commodity	Number of Properties Explored
Gold	53
Uranium	25
Silver	9
Base Metals	19
Tungsten and Other Metals	7
Coal	1
Iron	1
Total	115

Claim Staking

The staking of 547 claims during 1983 increased the area of new claim staking to 331 400 hectares compared with 159 400 hectares in 1982. However, the lapsing of 5 424 claims reduced the claimed area by 703 289 hectares and by December 31, 1983, the total claimed area stood at 40 952 claims in good standing covering 3 114 606 hectares.

Most of the increase in claim staking activities in 1983 was directed to areas of gold potential, particularly the Archean Slave Province, which extends from the north shore of Great Slave Lake northward to the Coronation Gulf. This region contains gold-bearing Yellowknife Supergroup volcanic and sedimentary rocks.

During the year, 218.5 thousand hectares of claims were staked in the Slave Province out of the total area staked of 331.4 thousand hectares. Barring a significant decline in the price of gold, exploration in areas of gold potential will continue to be vigorous over the next few years.

Ninety-six prospecting permits were issued in 1983, an increase of five over the number granted in 1982. The majority of the new permits are in the Arctic Islands.

Table 5.
Claims Staked in Northwest Territories,
1982 and 1983

Mining District Region	1983		1982	
	Claims Recorded	Area (Thou- sand Hectares)	Claims Recorded	Area (Thou- sand Hectares)
<i>Arctic and Hudson Bay</i>	88		106	
Arctic Islands		4.0		22.8
Keewatin District		83.9		83.4
<i>Mackenzie</i>	430		145	
Slave Province (Northeast Mackenzie)		218.5		20.7
Bear Province (Northern Mackenzie)		13.3		6.7
East Arm Subprovince		—		0.1
Pine Point District		0.1		0.7
<i>Nahanni</i>	29		35	
Cordilleran Province		11.6		25.0
Total	547	331.4	286	159.4

Diamond Drilling

Total surface diamond drilling amounted to some 141 000 m during 1983 compared to 136 494 m during the first 10 months of 1982. Drilling on two properties in the Pine Point zinc-lead district accounted for 45 per cent of all drilling. Several other large drill projects were conducted near operating mines.

Table 6.
Surface Diamond drilling in Northwest Territories, 1983

Region	Properties Drilled	Thou- sands of Meters	Properties with more than 20 holes	
			No. of Projects	Thou- sands of Meters
Arctic Islands	2	9.3	2	8.9
Churchill Province (Keewatin and S.E. Mackenzie)	14	22.8	—	—
Slave Province (Northeast Mackenzie)	26	22.9	3	8.0
Bear Province (Northern Mackenzie)	8	14.8	1	10.0
East Arm of Great Slave Lake	1	3.0	—	—
Pine Point District	2	63.3	2	63.3
Cordilleran Province (Nahanni)	4	4.9	—	—
Total	52	141.0	9	92.7

*Data includes drilling reported to February 15, 1984. Not all drilling reports were received.

A list of exploration companies active in the Northwest Territories during 1983 as given in Table 7 and locations of these activities are shown by corresponding numbers on the map in the centerfold.

Exploration Projects

Gold

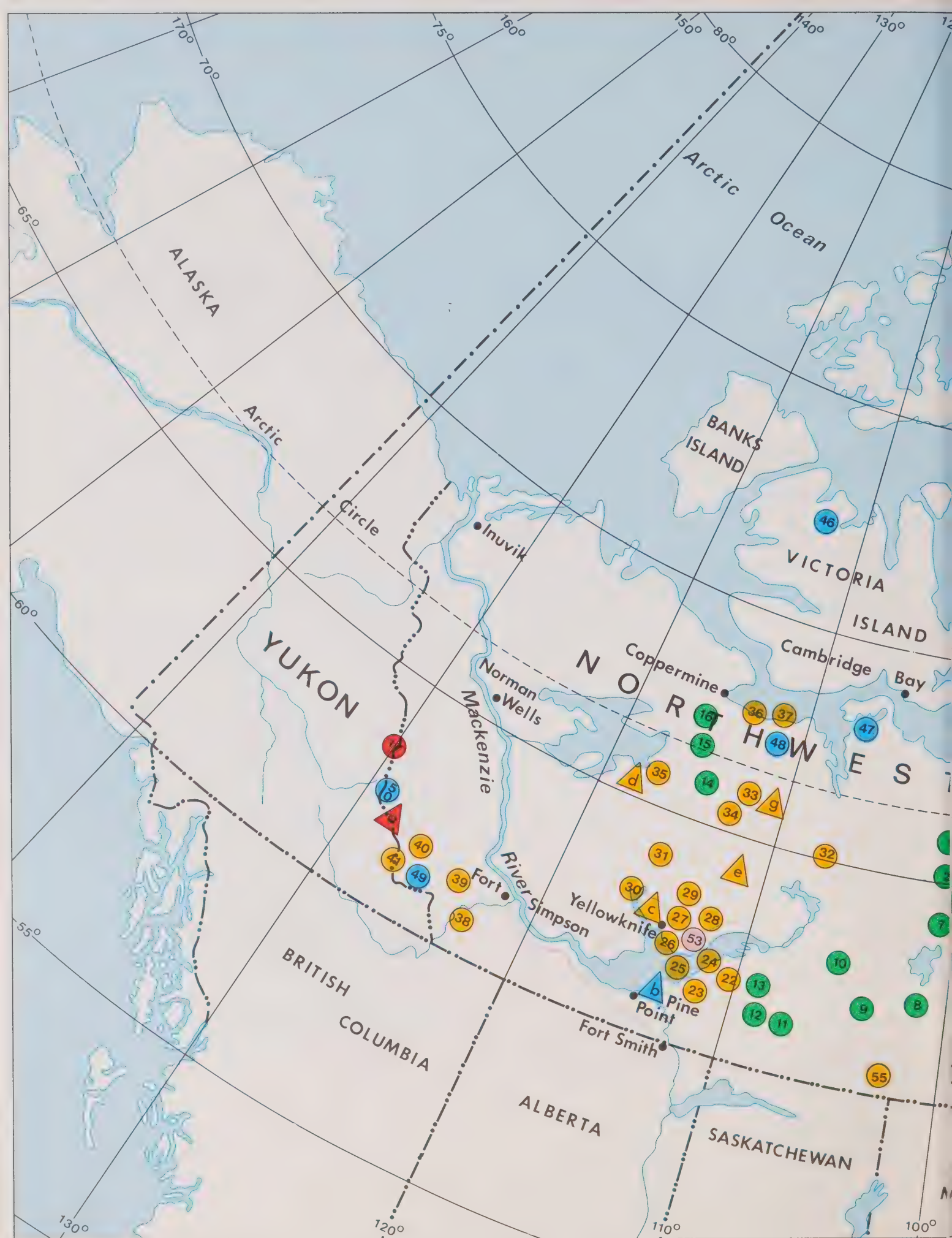
Gold exploration, concentrated for the most part in Slave Province, northeast Mackenzie District, comprised half of the exploration projects in the Northwest Territories during 1983. The increased exploration activity was accompanied by an expansion of the mill capacity of the Lupin Mine (g), start up of the Salmita Mine (e) and encouraging results from underground exploration at Terra's Bullmoose Lake property (26).

In the Indin Lake (31) supracrustal belt, 175 km north-northwest of Yellowknife, *Esso Resources Canada Limited* conducted reconnaissance exploration.

Treasure Island Resources Corp. drilled eight holes totalling 917 m on the DAN 9 claims (31) on the south side of Treasure Island, Spider Lake, 232 km north-northwest of Yellowknife.

In the Russell Lake area (30), 75 km northwest of Yellowknife, *Host Ventures Ltd.* drilled 7 holes totalling 193 m of the DON claim, 4 km north of Slemon Lake. Gold mineralization was intersected within bands of sulphide mineralization in breccia zones.

Roxwell Gold Mines Ltd. mapped, sampled and diamond drilled on the MOS claims (30) at the south end of Mosher Lake.



MINERAL EXPLORATION AND MINING NORTHWEST TERRITORIES — 1983

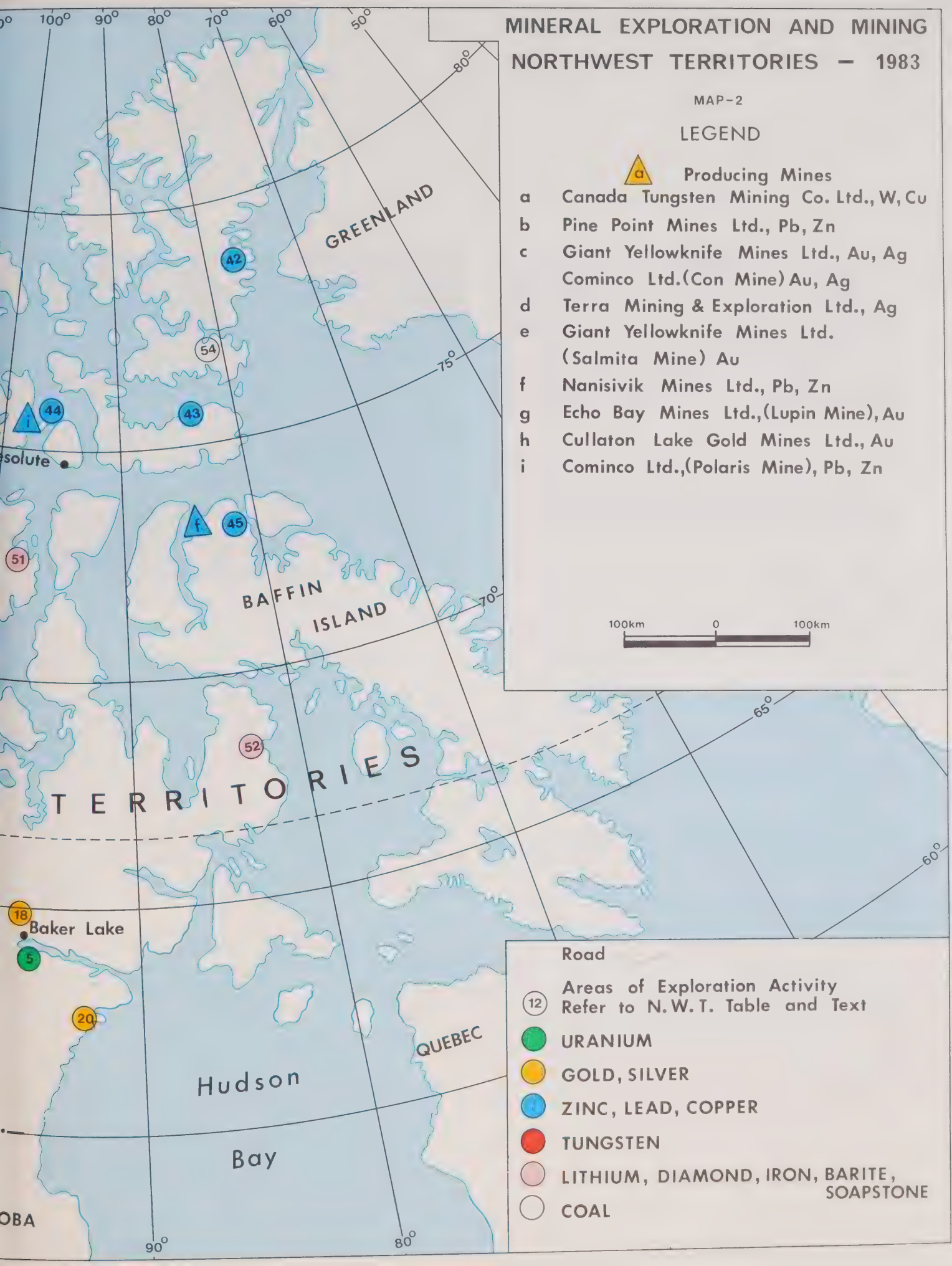
MAP-2

LEGEND



Producing Mines

- a Canada Tungsten Mining Co. Ltd., W, Cu
- b Pine Point Mines Ltd., Pb, Zn
- c Giant Yellowknife Mines Ltd., Au, Ag
Cominco Ltd. (Con Mine) Au, Ag
- d Terra Mining & Exploration Ltd., Ag
- e Giant Yellowknife Mines Ltd.
(Salmita Mine) Au
- f Nanisivik Mines Ltd., Pb, Zn
- g Echo Bay Mines Ltd. (Lupin Mine), Au
- h Cullaton Lake Gold Mines Ltd., Au
- i Cominco Ltd. (Polaris Mine), Pb, Zn



Road

- (12) Areas of Exploration Activity
Refer to N.W.T. Table and Text
- URANIUM
- GOLD, SILVER
- ZINC, LEAD, COPPER
- TUNGSTEN
- LITHIUM, DIAMOND, IRON, BARITE,
SOAPSTONE
- COAL

Near Yellowknife at Negus Point (c), *Cominco Ltd.* drilled 37 holes on the Negus, PRW, PRWX claims and CAGEX fraction. These holes, totalling 1 240 m were drilled from the ice on Yellowknife Bay. At the Ptarmigan Mine (c), near Yellowknife, Cominco Ltd. mined 1 660 t of ore from a new decline to test an ore reserve block in the A vein, as part of the feasibility of reopening the mine. The ore was treated at the Con mill at Yellowknife. Production was 42.9 kg of gold.

Ardic Exploration and Development Ltd. conducted VLF-EM, magnetometer and IP surveys and sampled veins at the surface of the Thompson-Lundmark property (27), 80 km east of Yellowknife. This property produced gold intermittently during the 1940s.

Underground development, surface and underground diamond drilling at *Terra Mines Ltd.*'s Bullmoose Lake project (26), 80 km southeast of Yellowknife, was reported to have increased reserves on the No. 4 vein to 630 000 t grading 10.6 g gold per t compared with previous reserves of 22 575 t grading 10.57 g gold per t. Further exploration is planned to determine whether production is feasible.

Ethen Mines Ltd. erected a small mill, 4 km north-northwest of Bullmoose Lake (26), and processed a small tonnage.

Hidden Lake Gold Mines Ltd. dewatered the Ruth Mine shaft, near Chipp Lake (28) and resampled the gold-bearing vein.

Giant Bay Resources Ltd. drilled nine holes on the MAHE claim group on the northwest side of Knight Bay, Gordon Lake (29). A number of gold-bearing intervals were intersected.

Immediately north of Gordon Lake (29), *Newcan Minerals Ltd.* conducted VLF-EM, magnetometer and IP surveys and drilled a total of 1 528 m in 35 holes on the VEN group. A number of holes intersected gold values in a vein. The company also prospected the JANE claims, which adjoin the VEN group to the south.



"Shaker table" used for final separation of gold from heavy mineral concentrate.

Giant Yellowknife Mines Limited and *Noranda Exploration Company, Limited* in joint venture with *Getty Mines* were active in the Courageous Lake-Mackay Lake volcanic belt (e). *Giant Yellowknife* brought the Salmita Mine (e) into production and conducted exploratory drilling on the RED 24 claim north of the Salmita Mine mill, near the northern end of Matthews Lake; on the SALERNO 14 claim, 1 km east of the Salmita Mine; on the MAD 13 claim at the south end of Matthews Lake, near the Tundra Mine (e); and on the BS 1 claim, 3 km south-southeast from the southern end of Matthews Lake. Altogether 12 holes were drilled totalling 1 217 m.

About 1.5 km north of Matthews Lake (e), *Noranda Exploration Company, Limited* surveyed part of BERTHA 1 claim by IP, drilled 7 holes on the BERTHA 1 claim and two holes on the adjoining FAT 62 claim, for a total of 1 090 m.

American Chromium Limited surveyed the KR and TONY claim group (e), 8 km north-northwest of Noranda's KETZA 1 claim, by VLF-EM, magnetometer and geological mapping. Targets defined were drilled.

In the Back River belt (32), *Noranda Exploration Company, Limited* explored the SIDD 1-10 claims for gold-bearing metamorphosed iron formation by VLF-EM and magnetometer surveys. New claims were staked and a diamond drilling program was started in October. *Silver Hart Mines Ltd.* explored and drilled targets on the MATE claims on the Back River (32) and staked an additional 11 MATE claims. The adjoining area has been explored by *Cominco* and others since 1962 as the TOBY, GAS and SY claims. A three-man crew of *Esso Resources Canada Limited* explored the Reagan Lake and Back River areas (32). *Trigg, Woollett Consulting Ltd.* explored Prospecting Permit 973 near Index Lake (32) for the *Back River Joint Venture*.

In the Contwoyto Lake area, at and near the Lupin Mine (g), *Echo Bay Mines Ltd.* and several other companies explored for auriferous iron formation. *Highwood Resources Ltd.* managed work for a number of companies in the area and also staked large areas that were transferred to other companies. Companies with claims include *Aber Resources Ltd.*, *Amhawk Resources Corporation*, *Great Bear Development Corporation*, *Highwood Resources Ltd.*, *Kappa Resources Limited*, *Kamwood Resources Ltd.*, *Viscount Resources Ltd.*, *Wellington Resources Ltd.*, and *O.P. Resources Ltd.*

O.P. Resources Ltd. explored independently of Highwood Resources and its associates. The company prospected and diamond drilled its property 10.5 km southwest of the Lupin Mine (g). *Aber Resources Ltd.*'s FIN claims (g) were explored by VLF-EM, magnetometer, gradiometer and SP surveys. Four holes were drilled. Further to the southwest, *Kappa Resources Limited* drilled 4 holes to test a gold showing on the BARB claims (g).

Echo Bay Mines Ltd. drilled on its Lupin Mine lease and 13 holes were drilled 6 km south of the Lupin Mine on the DER 1 claim (g). Outside the Contwoyto Lake area, *Echo Bay Mines* explored the CUB 1 claim (33) between the northern arms of Itchen Lake and the SIK (previously FUZ A) claims and SKI claims (previously FUZ B claims), 20-25 km northeast of the CUB 1 claim (33). The company also explored the C claims on the east side of Contwoyto Lake, 25 km east of the Lupin Mine (g). The work in all cases was directed at locating gold-bearing iron formation targets. Large areas underlain by the Contwoyto Formation were staked.

Kidd Creek Mines Ltd. tested targets on the REN 24 claims near the Itchen River (34) by drilling 4 holes totalling 773 m. *Canuc Resources Inc.* drilled 1 520 m in several holes to test the North Vein on the Arcadia property (37) near Coronation Gulf.

In Keewatin District, *Inco Metals Ltd.*, *Cullaton Lake Gold Mines Ltd.*, *Suncor Inc.* and *Comaplex Resources International Ltd.* were active. *Inco Metals Ltd.* conducted ground geophysical surveys on claims on the Pork Peninsula (20) and investigated nearby areas.

Cullaton Lake Gold Mines Ltd. drilled approximately 6 300 m on the Shear Lake prospect and the B-Zone prospect near the Cullaton Lake Mine (h). A decline was completed on the Shear Lake Mine project.

Suncor Inc. explored at Mountain Lake (21) with Max-Min EM, magnetometer and IP surveys. Some 1 600 m of drilling were completed. *Comaplex Resources International Ltd.* investigated the precious metal potential of the Judge Sissons Lake (19) and Whitehills Lake (18) areas.

Golden Rule Resources Ltd. mapped and used lake sediment geochemical surveys in the Snowbird Lake-Ennadai Lake area (55) to locate gold mineralization in veins, in association with pyritic tuffaceous rocks and in sulphide facies-magnetite facies iron formation.

In the Cordilleran region, *Esso Resources Canada Limited* prospected its exploration permits (41), near a large Cretaceous intrusion, for gold and other precious metals. *Hudson Bay Mining and Smelting Co., Limited* prospected its Liard River permits (38) for placer gold.

Base Metals and Silver

Work continued in Slave Province in search of polymetallic volcanogenic massive sulphide deposits. *Aber Resources Ltd.* surveyed its AA and BB claims at Turnback Lake (29) by pulse EM. *Cominco Ltd.* resumed work on the RUN, FAST and XVM claims (48), south of Coronation Gulf where a grid was surveyed by EM. *Noranda Exploration Company, Limited* explored in the Hope Lake greenstone belt (47), where the company screened EM conductors on several claim groups by gravity surveys. Some 644 m of diamond drilling in 9 holes were completed.

In the Pine Point area, Interior Plains region, *Westmin Resources Limited* completed 6 080 m of drilling on the Slave Reef Project properties (b). *Pine Point Mines Limited* conducted extensive exploration work on its mineral leases (b) mainly by drilling and IP surveying. Total exploration drilling in the Pine Point District for both *Westmin Resources* and *Pine Point Mines* amounted to 63 000 m.

In the Cordilleran region, *Placer Development Limited* had good drilling results on the HUG lease (50). Nearby, *Alex Black* prospected the JAY claims (50) and found high grade samples bearing lead, zinc, gold and silver.

In the Arctic Islands, *Nanisivik Mines Ltd.* explored Area 14 (f), southeast of the Nanisivik Mine, and continued exploration in the mine area (f). *Pan-arctic Oil Ltd.* explored copper-silver targets in the Natkusiak volcanics of the Shaler Mountains region of Victoria Island (46).

Cominco Ltd. staked claims to cover Kalivik Island (44) northwest of the Polaris Mine. In the Arctic Islands, *Petro-Canada Ltd.* conducted reconnaissance exploration on its permit areas in southeastern Ellesmere Island (42) and northern Baffin Island (45) as well as eastern Devon Island (43).

Silver

Near Coronation Gulf, *Westsun Petroleum and Minerals Ltd.* acquired several claim groups (36) and explored near a recently discovered silver vein. South of Great Slave Lake, in the Talston River area (24), *Talston River Mines Ltd.* sampled argentiferous veins. In the Camsell River-Rainy Lake area (d), *Terra Mines Ltd.* continued diamond drilling at the Silver Bear Mine and drilled numerous holes on the Norex Mine-Smallwood Lake property (d). *Procan Exploration Ltd.* prospected and carried out geochemical sampling on several properties north of the Camsell River (35).

Uranium

In the Thelon Plain, southeast Mackenzie District, *Urangesellschaft Canada Limited* drilled over 1 000 m to test geochemical and geophysical anomalies in the Boomerang Lake area (10.) In the Keewatin District, *Urangesellschaft Canada Limited* drilled 1 200 m in the Thirty Mile Lake area (6) south of Baker Lake and 2 900 m in the vicinity of the Lone Gull deposit at Judge Sissons Lake (3), west of Baker Lake. Work at Long Lake (4) included 1 000 m of drilling. Surveys were conducted on claims southwest of Schultz Lake (3) and on claims east of Sand Lake (2). *PNC Exploration (Canada) Ltd.* explored claims and permits near Foster and Croft Lakes (9). The company also drilled and surveyed its KULT claims in the Nonacho-Thekulthili Lake area (12, 13). *Noranda Exploration Company, Limited* conducted ground surveys on its claims southeast of Baker Lake (5).

In Bear Province, *Anaconda Canadian Exploration Ltd.* drilled 3 505 m in 46 holes on the Bear Valley project (16) claims. *Uranerz Exploration and Mining Limited* mapped and prospected the Carousel Massif (14) and the Belleau Lake-Dumas Lake area (15).

Coal

In the Arctic Islands, *Petro-Canada Ltd.* mapped and sampled coal beds of the Tertiary Eureka Sound Formation in the Stenkul Fiord area (54), southern Ellesmere Island.

Iron Ore

Borealis Exploration Limited conducted geologic mapping and constructed an airstrip at its Roche Bay (52) iron ore property, Melville Peninsula.

Beryllium

Highwood Resources Ltd. conducted gravity and beryllometer surveys to evaluate the beryllium potential of its tantalum-niobium-rare earth deposits on its Thor (53) property, in the Blatchford Lake area. Surface samples from three zones indicated economically significant beryllium. A 3 000 m drill program to test the T Zone commenced in October, 1983.

Tantalum Mining Corporation of Canada Ltd. conducted a geochemical survey at Otto Lake (27), north of the Thompson-Lundmark Mine. A tantalum-beryllium and tin-bearing pegmatite outcrops on the TABE claims at Otto Lake.

Tungsten

In Cordilleran region, *Meno Resources Ltd.* conducted aerial geophysical surveys on the SWAN claim (a), 45 km southeast of Tungsten. *Canada Tungsten Mining Corporation Limited* drilled about 3 000 m on the Baker and Redpath prospects (a) and both underground and surface drilling continued at the Cantung Mine (a).

Table 7
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	Uranerz	Garry Lakes	U
1	Kidd Creek	Garry Lakes	U
2	Urangesellschaft	Sand Lake	U
2	Uranerz	Sand Lake	U
3	Urangesellschaft	LONE GULL	U
3	Urangesellschaft	Schultz Lake	U
4	Urangesellschaft	Long Lake	U
5	Noranda	Baker Lake	U
5	Aberford	Bissett Lake	U
6	Urangesellschaft	Thirty Mile Lake	U
7	PNC	Marjorie Lake	U
8	Urangesellschaft	Nowleye Lake	U
9	PNC	Foster Lake	U
10	Urangesellschaft	Boomerang Lake	U
11	Uranerz	Powder Lake	U
12	PNC	KULT	U
13	PNC	KULT (Nonacho Lake)	U
14	Uranerz	Carousel Massif	U
15	Uranerz	Dumas Lake	U
16	Anaconda	MUNCH, BEAR, GNAW	U
17	Amax	MACTUNG	W
18	Comaplex	Whitehills Lake	Au
19	Comaplex	Judge Sissons Lake	Au
20	Inco	Pork Peninsula	Au
21	Suncor	Mountain Lake	Au
22	L. Anderson/W. Kizan	Rutledge Lake	Au, Ni
23	A. Larocque	La Loche Lake	Au
24	Talston River	Talston River	Au
25	Cominco	East Arm of Great Slave Lake	
26	Terra	TA (Bullmoose Lake)	Au
26	Ethen	Bullmoose Lake	Au
27	Ardic	Thompson-Lundmark	Au
27	Tantalum	TABE	Ta, Be, Sn
28	Hidden Lake	RUTH	Au
29	Giant Bay	MAHE	Au
29	Newcan	VEN, JANE	Au
29	Aber	AA, BB	Pb, Zn
30	Host Ventures	DON (Slemon Lake)	Au
30	Roxwell	MOS (Mosher Lake)	Au
31	Esso Resources	Indin Lake	Au
31	Treasure Island	DAN	Au
32	Esso Resources	Reagan lake	Au
32	Noranda	SIDD	Au
32	Silver Hart	MATE	Au

Table 7 (continued)
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
32	Trigg, Woollett	Index Lake	Au
33	Echo Bay	CUB	Au
33	Echo Bay	SIK, SKI	Au
34	Kidd Creek	REN	Au
35	Procan	Camsell River	Ag
36	Westsun	Coronation Gulf	Ag
37	Canuc	ARCADIA	Au
38	Hudson Bay	Liard River	Au
39	D. Turner	Nahanni Range	Au
40	prospectors	McMillan Lake	Au
41	Esso Resources	Skinboat Lake	Au
42	Petro-Canada	Ellesmere Island	Zn, Pb
43	Petro-Canada	Devon Island	Zn, Pb
44	Cominco	Kalivik Island	Zn, Pb
45	Petro-Canada	Borden Peninsula	Zn, Pb
45	Nanisivik	BART	Zn, Pb
46	Panarctic	Shaler Mountains	Cu, Ag
47	Noranda	MERK, DOG, CAN	Zn, Pb
48	Cominco	RUN, FAST, XVM	Zn, Pb
49	SEREM	SOLTICE SPIRIT	Zn, Pb, Au
50	Placer	HUG	Zn, Pb
50	A. Black	JAY	Pb, Zn, Ag, Au
51	DIAND	Prince of Wales Island	Soapstone
52	Borealis	Roche Bay	Fe
53	Highwood	Blatchford Lake	Ta, Nb, Be, REE
54	Petro-Canada	Stenkul Fiord	Coal
55	Golden Rule	Snowbird Lake	Au
a	Meno Resources	SWAN	W, Au
a	Canada Tungsten	BAKER, REDPATH	W
b	Pine Point	Pine Point	Zn, Pb
b	Westmin	Slave Reef Project	Zn, Pb
c	Cominco	NEGUS	Au
c	Cominco	PTARMIGAN	Au
d	Terra	ITLDO, MJ	Ag
d	Barons Oil	Rainy Lake	Ag
e	Giant	RED, TOUGH, MAD, BS	Au
e	Noranda	BERTHA, FAT	Au
e	American Chromium	KR, TONY	Au
f	Nanisivik	Area 14	Zn, Pb
g	Echo Bay	C, DER, BRI, PEN	Au
g	Bow Valley	FIN	Au
g	O.P. Resources	IFOR	Au
g	Aber/Highwood	FIN	Au

Table 7 (continued)
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
g	Kappa/Highwood	BARB	Au
g	Hemisphere/Viscount	AU	Au
h	Cullaton	Shear Lake	Au
h	Cullaton	COD, JUDY, NOBE	Au

Footnotes for Tables 7 and 8

(1) Table location is made with reference to corresponding numbers on Yukon and Northwest Territories Maps. Locations are approximate.

(2) Abbreviated name of the Company is used: Expl. (Exploration), Ltd. (Limited).

(3) Geographical areas are indicated by small print, whereas claims and groups are capitalized. Abbreviated words are: Peninsula (Pen), River (R), Lake (L).

(4) Metal(s) of primary importance defined by chemical symbols: copper (Cu), gold (Au), lead (Pb), tantalum (Ta), Lithium (Li), asbestos (Asb), molybdenum (Mo), silver (Ag), barium (Ba), cobalt (Co), tin (Sn), iron (Fe), tungsten (W), niobium (Nb), beryllium (Be), rare earth elements (REE), mercury (Hg), antimony (Sb) and uranium (U).

Table 8
Exploration - Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	Rio Alto	Rusty Springs	Ag, Pb, Zn
2	Ebony/Dawson Eldorado	PLATA	Ag, Pb
3	AGIP	LEAF	Au
3	AGIP	DALL	
4	Cominco	SUN, FIRE, ICE	Au, Bi
4	Canamax	NUT	
5	AGIP	WALL	Au
6	Trident	SEL	Au, Ag
7	Canamax	NURF	Au, Ag
7	AGIP	WENDY, RAGS	
8	Archer, Cathro	SADIE LADUE	Ag
8	Island Mining	MAG	Ag
8	Springmount	Silver Spring	Ag
8	Springmount	Mount Keno	Ag
9	Dawson Eldorado/Archer, Cathro	LONE STAR	Au
9	Cominco	BRONSON	Ag, Pb, Zn, Cu
10	Canico	RAIN	Au, Hg, Ba
11	Archer, Cathro	LILYPAD	Ag, Pb
12	Arctic Red	LAFORMA	Au
13	Iona	KETZA	Ag, Pb, Zn
14	AGIP	LATER	
15	AGIP	WOOF, KUKU, CHIEF	Au, Ag
15	AGIP	GLENLIVET	Au
16	Canico	TON	
16	Tally-Ho	TH	Au, Ag
16	AGIP	TYCON	Au, Ag
17	Logan	JUBILEE	Au, Ag, Cu
18	Klondike Silver	ANT, BRU	
19	Cima	Mt. Hundere	Ag, Zn, Pb
20	Getty/Regional	MR, MEISTER	Ag, Pb, Zn
21	Acheron	BUD, DAGO	Zn, Pb, Ag
22	Getty	Clear Lake	Pb, Zn, Ag
22	Cominco	TUM	Pb, Zn
23	AGIP	BRICK, NEVE	Sb, As
23	Cominco	HESS	Zn, Pb, Ba
24	Cominco	NIDD	Zn, Pb
24	Aberford	JASON	Pb, Zn, Ag
24	Cominco	HASTEN, BASIN, FETCH	
24	Hudson Bay	TOM	Pb, Zn, Ag, Ba
25	Hudson Bay	PELLE BANKS	
26	Canamax	ZOO, ZAP	Zn, Pb
27	Cambac	BAR	Pb, Zn, Ag, Ba
28	Regional	LOGAN	Zn, Ag, Sn

Table 8 (continued)
Exploration – Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
29	Butler Mountain	YP	Zn, Pb, Ag
29	Hardy International	JACK	Zn, Pb, Ag
29	Beaver	WIND	Ag, Pb, Zn
29	Regional	MID	Zn, Pb, Ag, Ba
30	Sulpetro	MEL EAST	Zn, Pb, Ba
31	Noranda	RAIL	W
32	Territorial Gold	GLAC	W, Au
33	Union Carbide	KALZAS	W
34	Amax	MACTUNG	W
35	A and M Exploration	RIETTA	W
36	DC Syndicate	ORK	Sn, Cu, Ag
37	DC Syndicate	JAR	Sn, Zn
37	Du Pont	SWIFT, MC	Sn, Zn
38	Du Pont	VAL	Sn, Zn
39	Canamax	HOT	W, Mo
40	Archer, Cathro	OBVIOUS	W
41	Noranda	MARN	Cu
42	Archer, Cathro	NUCLEUS	Cu
43	DC Syndicate	CAL	Cu
44	Canamax	NARL	Cu, Pb, Zn, Ag, W
45	Noranda	TAK	
45	A.J. O'Brien	AF	
46	Stubenberg	BEAV	
47	S. Goodlife	CAN	W
48	Jackson Hill	Klondike area	Placer Au
48	Main Street	Klondike area	Placer Au
49	Chumar	Sixtymile area	Placer Au
50	Kerr Addison	KOE	Au
50	Tombill	Hayes	Au, Pb, Zn
51	Dawson Syndicate	SYNDICATE, DAWSON	Au
52	Kerr Addison	HIK	Au
53	Kerr Addison	GE	Pb, Zn
b	Cyprus Anvil	TIE, FIRTH	Zn, Pb

Economic and Policy Analysis

The recent economic recession severely affected the mining industry world wide, causing a sharp decline in most metal prices. Many mining operations were not able to operate at such price levels and had to close for an indefinite period. Since competition is expected to accelerate in the coming years, operators have realized that their survival will depend upon their ability to reduce costs while increasing their productivity and efficiency.

In this issue of Mines and Mineral Activities, the major economic events that have affected the northern mining industry in 1983 and the response measures that were taken by some companies to improve their ability to survive in the long run are reported. A review of the most significant policy developments and issues relevant to the northern mining industry is made. Finally, an analysis of the competitive position of northern mines and their ability to compete in the future is presented in Appendix 1.

Overview of the Northern Mining Industry

During the second half of 1983, world metal markets began to improve slowly from recession levels in response to the economic recovery. Consequently, 1983, was a transitional year for the mining industry.

Mixed results were noticed in the northern mining industry during the year. In the first half, the final effects of the recession resulted in the closure of Pine Point Mines Ltd. (January 2) and of Canada Tungsten (January 21). Fortunately, the economic recovery began to be felt in the second half with the reopening of Pine Point (June 15), United Keno Hill (August 1) and Canada Tungsten (November 28).

An important factor in the mines re-opening was a recognition of the need for greater management/labour/government co-operation to ensure the long term economic viability and competitive position of some mature mines in the Northwest Territories and the Yukon. Significant management, operational and cost structure reorganizations were achieved at United Keno Hill, Canada Tungsten, Cyprus Anvil and Pine Point. These changes, in conjunction with anticipated better market conditions, allowed the reopening of the mine/mill operations at all of them except Cyprus Anvil which reopened on the basis of an advance stripping program.

An encouraging feature arising out of the recession has been the ability of some northern mines to compete under some of the worst economic conditions despite their remoteness. These included Cominco's Polaris Mine, Nanisivik Mines Ltd. and most gold producers in the NWT.

Yukon

The Yukon mining industry was still severely affected by the recession in 1983. For most of the first half of the year, the industry was almost non-existent as all lode mines were closed. Both the value of production at \$59.4 million and employment at about 500 person-years, including placer mining employment, were at record lows.

The extent of the decline in mining activities in the Yukon was demonstrated by the dramatic reduction in its contribution to the total value of Canadian metallic mineral production. In 1983 it accounted for only 0.8 per cent compared with 2.45 per cent in 1982 and 3.76 per cent in 1980. With the decline in lode mining, the relative importance and stabilizing role of gold placer mining became more obvious during 1983. It accounted for 85 per cent of the total value of mineral production in the Yukon and for more than half of the employment. It was only with the full resumption of placer mining operations that some revival in activity was noticed. As a result of placer mining operations Yukon still contributed significantly to total Canadian gold production. In 1983, it accounted for 4.3 per cent of Canadian production. Yukon also accounted for 1.6 per cent of the silver production and 0.2 per cent of lead production.

Some positive events took place during the second half of the year which can be interpreted as forerunners of an improved situation. Following the successful negotiation of an agreement between Cyprus Anvil/Dome Petroleum and the federal government, Cyprus Anvil Mining Corporation (CAMC) recalled about one third of its employees at the end of May to carry out an advance stripping program. The agreement, which aims at improving the long-term viability of the mine at the same time as providing employment to a minimum of 210 persons, provides for a \$50 million two-year advance waste stripping program. The cost is to be shared equally between the government and Dome. The \$25 million government share is financed as follows: about \$4 million under the UIC Section 38 and New Employment Expansion and Development (NEED) programs; \$1 million wage top-up by the Yukon Government, and about \$20 million as an interest-free loan. The loan will be repayable prior to, or simultaneously with, other bank loans on the basis of 25 per cent of quarterly positive future cash flows to be generated by the Faro mine. The company anticipated that the stripping program and the major concessions granted by CAMC labour unions would reduce operating costs by eight per cent and increase the mine's productivity by about 20 per cent.

United Keno Hill resumed its operation on August 1, 1983 after being closed for more than a year. Many changes which should contribute to an improvement in the long term economic viability of the mine permitted the start up.

First, the company and the unions successfully negotiated a new two-year collective agreement which calls for improved productivity, reduced unpaid leave (bush leave), abandonment of the cost-of-living allowance, a 173 per cent increase in the daily charge for room and board and a wage increase limited to 6 per cent (January 1, 1984) and 5 per cent (January 1, 1985). Second, the mine will operate at reduced capacity ($\frac{2}{3}$ of previous capacity) and work force (140 employees, 59 per cent of pre-shutdown level). Third, the company which was previously selling its concentrate to Asarco's Montana smelter, will now be selling it to Cominco at Trail, B.C. The concentrate will be trucked to Fort Nelson, and from there loaded on rail to Trail, B.C. This change of concentrate destination should result in an overall reduction in transportation costs to the company. The processing of concentrate in Canada as well as the increased Canadian content in the outbound transportation should contribute to an increase in the value-added to the Canadian economy per unit of concentrate produced at the mine.

At year end, total employment by lode mines in Yukon was 316 persons. This compared to 1 030 persons during the first half of 1982. In addition many seasonal jobs were available in 1983. Eighteen persons were employed in three underground placer mines, 40 persons were employed in small lode-mine underground exploration development and production and an estimated 750 persons were employed in surface placer mining operations.

Northwest Territories

Although two mines were closed for a significant period during the year, the Northwest Territories mining industry was able to increase its gross value of production by 9.1 per cent. The industry is now generating production revenues of more than half a billion dollars per year. Unlike Yukon, where the industry was severely affected in 1982, the NWT mining industry did not really feel the shock of the recession until the first half of 1983 with the closure of the Pine Point Mine on January 2 for a period of 6½ months, and Canada Tungsten for a period of 10 months. Over 700 employees were directly affected by these temporary closures.

The remaining gold mining producers and the two zinc-rich mines, Polaris and Nanisivik, performed relatively well during the period. At year end, all mines were back into operation and total employment was 2 369 persons compared to 2 440 in 1982.

The ability of the Northwest Territories mining industry to survive the recession better than the Yukon's is highly evident from its relative contribution to total Canadian mining output. In 1983, it accounted for 26.5 per cent of the lead, 23 per cent of the zinc, 96.9 per cent of the tungsten, 12.9 per cent of the gold and 4.6 per cent of the silver produced in Canada. In spite of the recession and some temporary closures, the mining industry in the NWT was able to increase its contribution to the value of Canadian metallic mineral production to 6.5 per cent compared to 5.6 per cent in 1982.

The Pine Point mine case was a good example of the new spirit of cooperation among key players interested in the survival of a mine. Pine Point was shut down because of high operating costs arising from the increasing ore to waste stripping ratio and low metal prices. Cominco negotiated a package of concessions with some of its suppliers, employees and governments in order to re-open the mine/mill complex on a break-even basis for a minimum of at least five months. The concessions included: reduced smelter charges; a 10 per cent reduction in rail freight rates; adjustment to electricity bills; a 15 per cent reduction in wages and benefits for staff personnel; a 10 per cent reduction on all wage classifications for one year, or less if metal prices reach 34.5¢ for lead and 60.5¢ for zinc; and a freeze on cost of living allowances. Federal government assistance through the UIC Section 38 and NEED programs in the amount of \$4 million and a \$1.1 million wage top-up by the Government of the Northwest Territories were provided to assist the company in carrying out an advance stripping program aimed at improving its future ore to waste stripping ratio. As a result of these concessions, the mine reopened on June 15.

Canada Tungsten reopened on November 28, after a 10-month shut down following a reorganization of senior management positions, concessions by the labour unions, which limited wage increases to 6 per cent and 5 per cent over the next two years, and the need to fulfill anticipated industrial demand. The mine reopened at half capacity and with only 130 employees representing 61 per cent of its previous work force. Of interest is the fact that the mine reopened on the basis of a tungsten price which was below the price level at the time of the shutdown. This can be interpreted as a sign of improved operating conditions at the mine following the various measures implemented since the shutdown. A further sign of company management's confidence in the long-term viability of the mine is the fact that during the shutdown period it kept about 80 employees and maintained its level of underground development and exploration at the mine site.

Giant Yellowknife Mines, which suffered a loss last year, decided to introduce some cost control programs and efficiency measures to increase the profitability of the operation. Furthermore, in an effort to increase the long term viability of the mine, the company decided to cut back production by 25 per cent to enable orderly extraction of ore reserves and to allow more time for exploration and development of additional reserves. The cut back of production affected about 65 company and contractor employees. These layoffs were, however, compensated for by the opening of the company's Salmita project in August which provided employment to about 70 persons.

Overall, compared to the Yukon, the NWT mining industry is in relatively good health and has been expanding. Furthermore, with the measures that have been taken by some of the companies, in co-operation with the labour unions, to increase efficiency and productivity, the industry should come out of the recession stronger and be well positioned to take full advantage of the economic recovery.

Review of Policy Issues

During 1983 there were several policy developments or issues of direct and indirect interest to the northern mining industry. These are discussed briefly in the following sections.

Northern Mineral Policy

Development of the northern mineral policy continued in 1983. Efforts have been concentrated on the assessment of the role of mining in the northern and national economies as well as the competitiveness and outlook for the northern mining industry. Formulation of the policy will require the consideration of the many complex interrelationships which affect northern mineral development including the provision of infrastructure, the legislative and fiscal regime, the environmental protection/mining interface, the human factors in mining, native land claims and research and development requirements.

As a continuation of the consultative process which has been part of the policy development process, a series of eight mineral policy issue papers have been developed and will be released in the Spring of 1984. Each paper provides a data base and summary of one key policy issue.

Northern Canada Power Commission – National Energy Board Hearing

In recent years, the mining industry complained that its power costs have been dramatically increased and has expressed disagreement with the rate structure developed by the Northern Canada Power Commission (NCPC). Following the release of the Penner Report, the Minister of Indian Affairs and Northern Development (IAND), with the concurrence of the Minister of Energy, Mines and Resources, requested the National Energy Board (NEB) to undertake an inquiry and advise the Minister of IAND on NCPC rate-setting methods. The purpose of the NEB inquiry was to seek an equitable solution to the dilemma of NCPC's public accountability on the one hand and the Federal Government's financial responsibility on the other hand.

Following public hearings in a number of Yukon and Northwest Territories communities, the NEB submitted its report to the Minister of IAND in August, 1983. In February 1984, Cabinet approved a new role and mandate for NCPC in northern energy as follows:

- Relocation of NCPC headquarters from Edmonton to Yellowknife
- Regulation of NCPC by a panel of the NEB with territorial participation
- Implementation of new rate setting principles to reflect the true cost of delivering power to all users
- Reassessment of NCPC's debt structure to determine whether and how much debt should be written off or converted to equity
- Continuation of direct federal energy subsidies to March 1985

Overall, these changes should be welcomed by the northern mining industry.

Northern Road Policy, A Five-Year Program

A revised Northern Roads Policy was approved on July 7, 1983. The new policy places control of policy, planning and construction for new roads and inter-territorial roads with the federal government and the responsibility for maintenance with the territorial governments. It further clarifies the Government's role in all stages of the road program as far as resource roads are concerned.

Cabinet authorized a five year road program with funding of \$19.2 million per year for new road construction. Part of this program allows for federal cost sharing of initial access roads for exploration and development purposes as well as permanent access roads for the production stage of mining.

Canadian Transport Commission Inquiry – Yukon Transportation Requirements

The Canadian Transport Commission (CTC), at the request of the Yukon Government, has been conducting an inquiry into Yukon transportation systems, including the railway. The purpose of this inquiry was to determine which options would provide the most adequate, efficient and lowest cost surface transportation system, or systems, to service the short, medium and long-term requirements of Yukon. However, in view of the immediate need to address the Cyprus Anvil Mining Corporation's (CAMC) transportation requirements, the inquiry focused its attention on what would be the most cost-effective and efficient transportation system and route to service CAMC, once the mill starts to produce.

The CTC published an interim report on December 15, 1983 with its preliminary findings and recommendations. The report concluded that the lowest-cost option for the transportation of CAMC concentrates and back-haul traffic is the existing White Pass and Yukon truck-rail system when all costs are taken into consideration. All interested parties were requested to rebut or comment on the report by February 15, 1984, following which the CTC will prepare its final report and recommendations.

Yukon Placer Mining Guidelines

The Department of Indian Affairs and Northern Development, together with the Department of Environment and the Department of Fisheries and Oceans, has prepared draft environmental guidelines for the placer mining industry in Yukon which were made public in March 1983. The guidelines are designed to enhance protection of fish and wildlife resources while allowing mining of placer gold with protection of the various interests, such as the native and domestic food fisheries, commercial fisheries and mining development.

In order to review the draft Yukon Placer Mining Guidelines dealing with environmental controls in the Yukon placer mining industry, a four person review committee, appointed by the Minister of Indian Affairs and Northern Development, held an intensive round of public hearings from September to November, 1983 in five Yukon communities. The Review Committee submitted its report to the Minister of IAND in January, 1984 and it is now available to the public. The report represents the Committee's view of how best to implement guidelines governing water use and land rehabilitation for Yukon's placer mining industry. DIAND is reviewing the report, and a ministerial decision is expected in 1984.

Taxation of Northern Benefits

During 1983, the mining industry conducted an extensive publicity campaign against the proposed phase-in of taxation of northern benefits beginning in 1984. Mining companies and labour unions pointed out that life in the North was costly, and argued that government should assist people who lived there. A committee representing industry and labour was established to study the impact of the proposed new tax regime on northerners.

On December 9, 1983, following consultations between the Department of Finance and the Committee, the Minister of Indian Affairs and Northern Development announced on behalf of the Minister of Finance, that the special tax remission for housing and travel benefits received by employees in Northern Canada and isolated posts will be maintained for an indefinite period.

This decision was taken to help northern communities overcome current economic difficulties. The northern economy and, in particular, the mining industry was in a weak state due to the slow recovery of world markets and mineral prices. This tax relief should provide impetus to recovery and allow additional time for adjustment.

Pipeline Right-of-Way Narrowed

In October, 1977 a corridor 8 km (5 miles) in width, along the route of the proposed Alaska Highway Gas Pipeline, was withdrawn from surface use and mining in the Yukon. On December 28, 1983 the Minister of Indian Affairs and Northern Development announced that the land withdrawal has been revoked. This was made possible by the granting of a 240 m wide easement to Foothills Pipeline Ltd. for future construction of the pipeline.

The revocation will become effective June 29, 1984. At that time land previously within the corridor will be available for mining activity as well as surface dispositions pursuant to the *Territorial Lands Act*.

Competitive Position and Survival of Northern Mines

The severe economic recession that struck the world economy in 1981-82 was particularly serious for the Canadian mining industry due to its reliance on export markets for its metal and concentrates. The recession did, however, have some positive results since it forced companies to reassess their short- and long-term competitive position. In view of the static, real price levels, the remoteness of the territories, and all the factors which contribute to increase the cost of mining north of 60°, one could ask whether or not northern mines will be able to continue to compete in world markets. The following discussion attempts to answer this question by assessing some key factors such as production costs, transportation costs and related problems, prices trends, mine maturity and profit margin.

Production Costs

The most common measure used to assess the relative competitive position of world metal producers is to rank them in terms of unit cost of metal produced. This indicator shows the ability of mines to survive negative price cycles. Using this measure, international surveys in 1981 indicated Canada was one of the lowest cost producers of zinc in the world. Two out of the three zinc producers north of 60° were in the mid range of Canadian producers, based on 1981 costs: Pine Point and Nanisivik. On the other hand, a review of 1983 company annual reports of northern precious metal mines suggest that, while profitable, they tend to have higher production costs than the major southern producers.

The ability of northern mines to compete with southern mines and other more favourably located mines in the rest of the world is mainly attributable to special factors which offset higher unit costs of productive resources employed. These factors are: richness and size of orebodies, proximity to tidewater, lower mining requirements for development and waste removal, and amenability of ore to concentration. These positive factors compensate for the higher labour unit costs (about 25 per cent), higher power rates (2 to 3 times higher) and the transportation cost and logistical problems faced by northern mines.

Transportation

Transportation is a particularly serious problem for concentrate producers as it affects both their ability to market their product and the cost. For example, the outbound freight cost of Pine Point and Cyprus Anvil represents respectively $\frac{1}{3}$ and $\frac{1}{4}$ of their total operating cost. It also affects the cost of their inbound supplies and the size of inventories of products, spare parts and supplies. In the case of Arctic mines, the short summer shipping season for transporting bulk commodities is the main factor. For interior mines, it is the resupply time of critical components and reagents. These factors create a requirement for higher levels of working capital resulting in higher financial costs.

Figure 3
Physical Output per Person Hour Worked
Percent Deviation of Annual Average to Period
Average

Figure 3-A: Selected Base Metal Mines

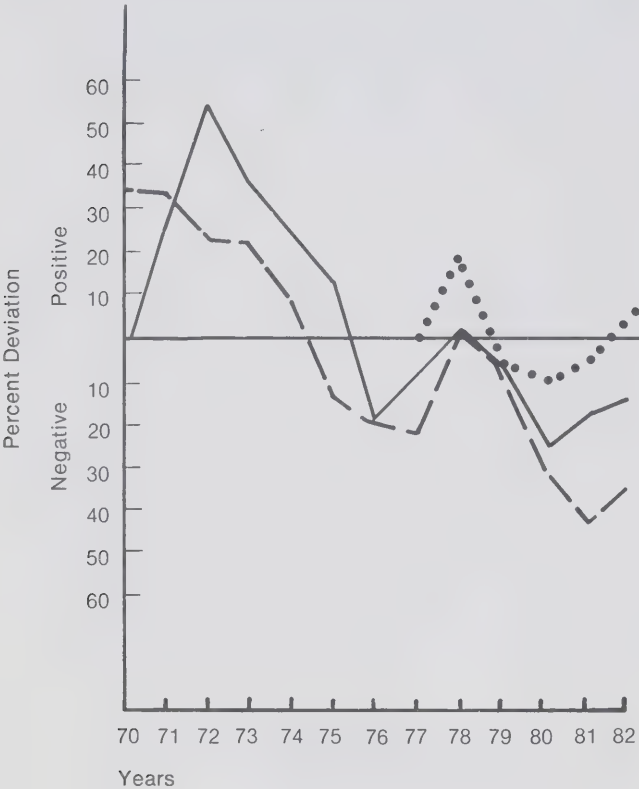
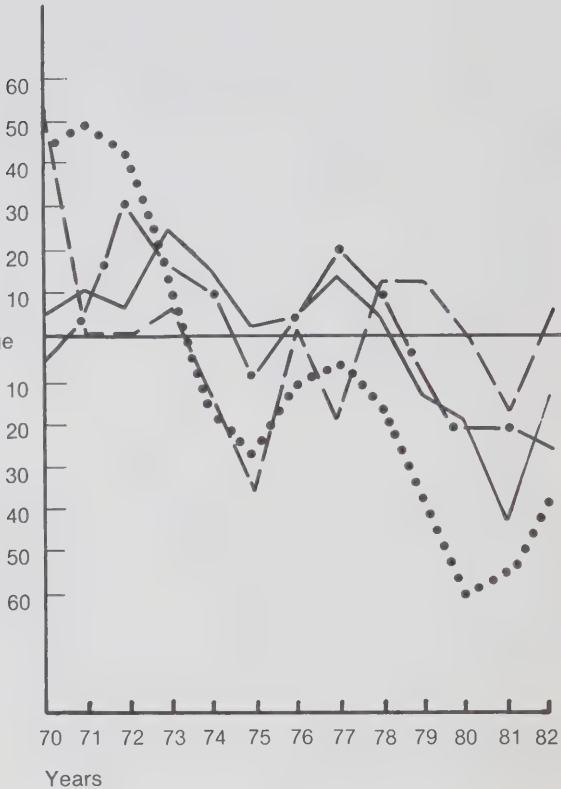


Figure 3-B: Selected Non Base Metal Mines



Metal Prices

A review of metal prices since 1960, including metals produced north of 60° (lead, zinc, tungsten, gold and silver), indicates that they were higher during the 1970s than in the 1960s. The relatively buoyant prices that northern producers enjoyed during the seventies, compared to those faced by southern copper and nickel producers is partly attributable to the fact that they did not have to face foreign competitors producing for foreign exchange to the same extent as southern copper and nickel producers. The favourable prices, combined with efficient production, led to spectacular income returns for most northern mines during that period. Most price forecasters indicate gloom for lead, copper, nickel and molybdenum, but a brighter outlook for zinc. As a result, three of the four northern lead-zinc producers seem well positioned for the future with relatively zinc-rich ore. Also optimism about precious metal prices augurs well for the future of northern gold producers.

Maturity

Many of the mines are at a mature stage of their life cycle as shown in Figure 3-A and Figure 3-B. The graphs show the deviation to average output per person hour worked for the period from 1970 to 1982, and reflect the trend in productivity as a result of labour performance, feed grades and technology. A large part of the downward trend is attributable to a combination of a lower ore grade being mined and higher stripping requirements. The downward trend shown in the graphs does not necessarily mean that the competitive position of the mines is eroding but it is a clear signal of potential problems.

Profit Margin

A key trend to consider in assessing the ability of a mine to survive is the directional relationship of unit costs of production and metal prices which indicates the trend in its profit margin. This trend can be observed by comparing Figures 4 and 5.

Figure 4 shows the percentage deviation from individual mine production costs. Figure 5 shows metal price averages for the period of 1970-1982, in constant 1982 dollars. In preparing Figure 4, annual unit production costs were determined from costs and units of production shown in annual reports. These were then adjusted to 1982 dollars using the consumer price index and an average determined for the period. The annual average (in 1982 dollars) was then compared to the period average to calculate the percentage deviation and to determine the trend of unit production costs around the average over time.

In preparing Figure 5, average annual London Metal Exchange spot prices for lead and zinc and Metals Week prices for silver and gold were converted to Canadian dollars or cents at average annual exchange rates. These prices were then escalated, averaged, and percent deviations calculated as for Figure 4.

Figure 4
Minesite Production and Administration
Costs per Unit of Output
Percent Deviation of Annual Average to
Period Average (in 1982 dollars)

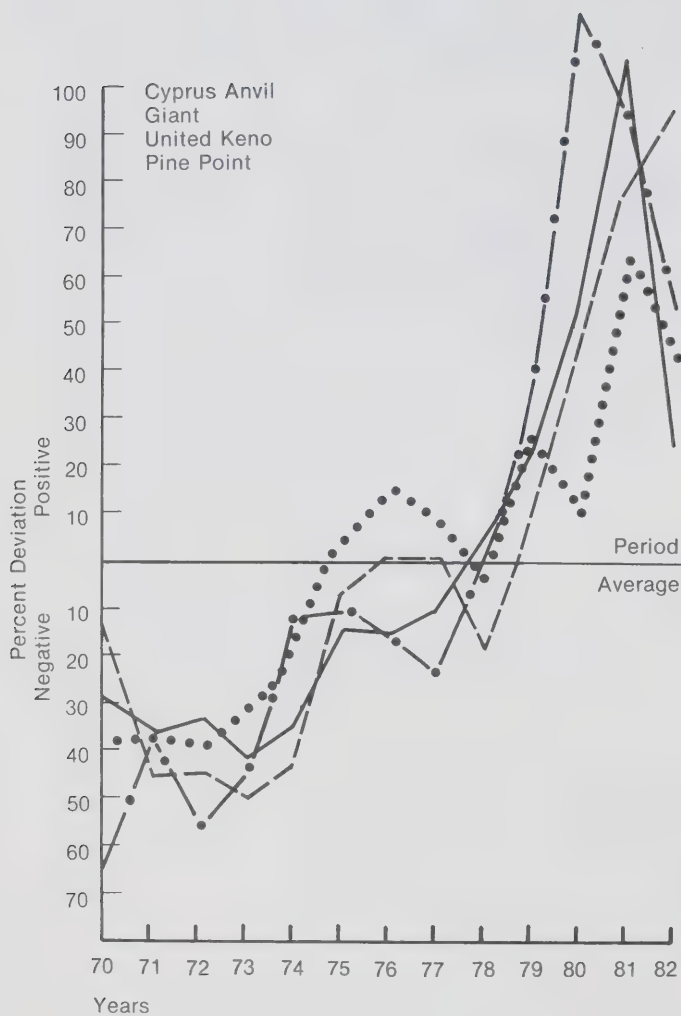
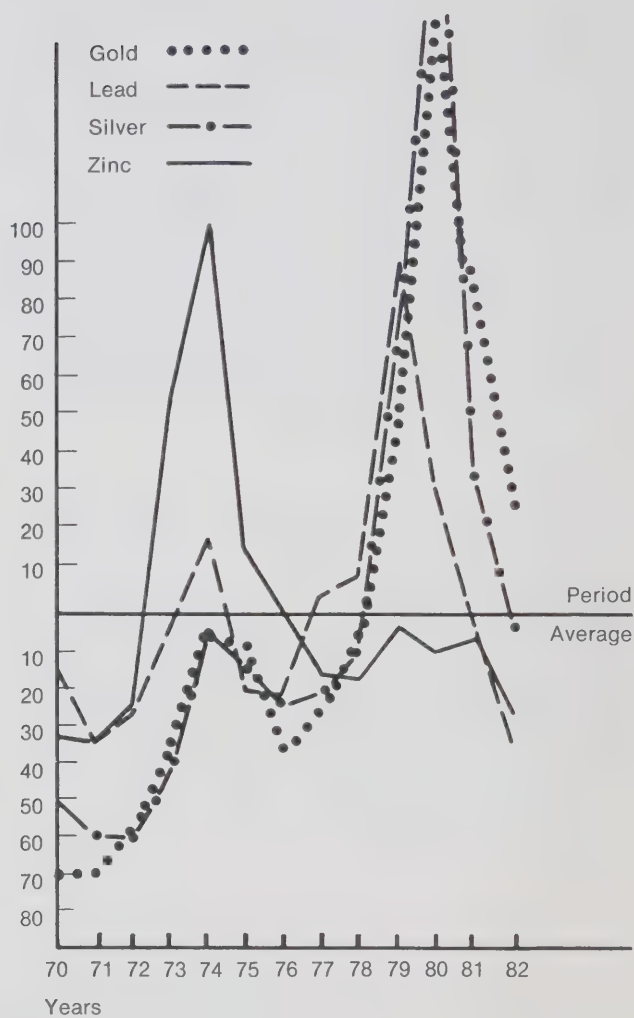


Figure 5
Metal Prices
Percent Deviation of Annual Average
to Period Average (in 1982 Dollars)



Comparing the trend in production costs (Figure 4) with that of metal prices (Figure 5), it is clear that while efforts at unit cost reduction have followed price declines, the upward cost trend is much steeper than price trends for the base metals. The increasing differential between the prices and production cost trends over the years is an indication of reduced profit margin and ability of mines to survive during major downward price cycles. Based on current information, it is not possible to determine the relative impact of intentional feed grade reductions at higher prices, wage demands, and overall declines in reserve grades and mining options on the declining output per employee and increasing unit cost of production during that period.

Conclusion

There seems little doubt that individual northern mines have been profitable and will be profitable in the future. However, some concerns were identified. Many northern mines are arriving at a mature stage in their life cycle. Their metal output per person year has been declining and their production costs have increased. Unless these trends are offset by improved metal prices or by increased productivity, some current northern producers may face problems in years ahead.

As Canadian mines have little control of international prices, the key to future competitiveness seems to lie in finding and developing new richer orebodies, and using ingenuity to reduce the unit production costs of existing mines. While solutions to these problems lie with industry, the federal government has a role in establishing a framework within which the industry can plan and act with confidence.

Figure 6
Yukon Territory
Mineral Production
 (Millions of Dollars)

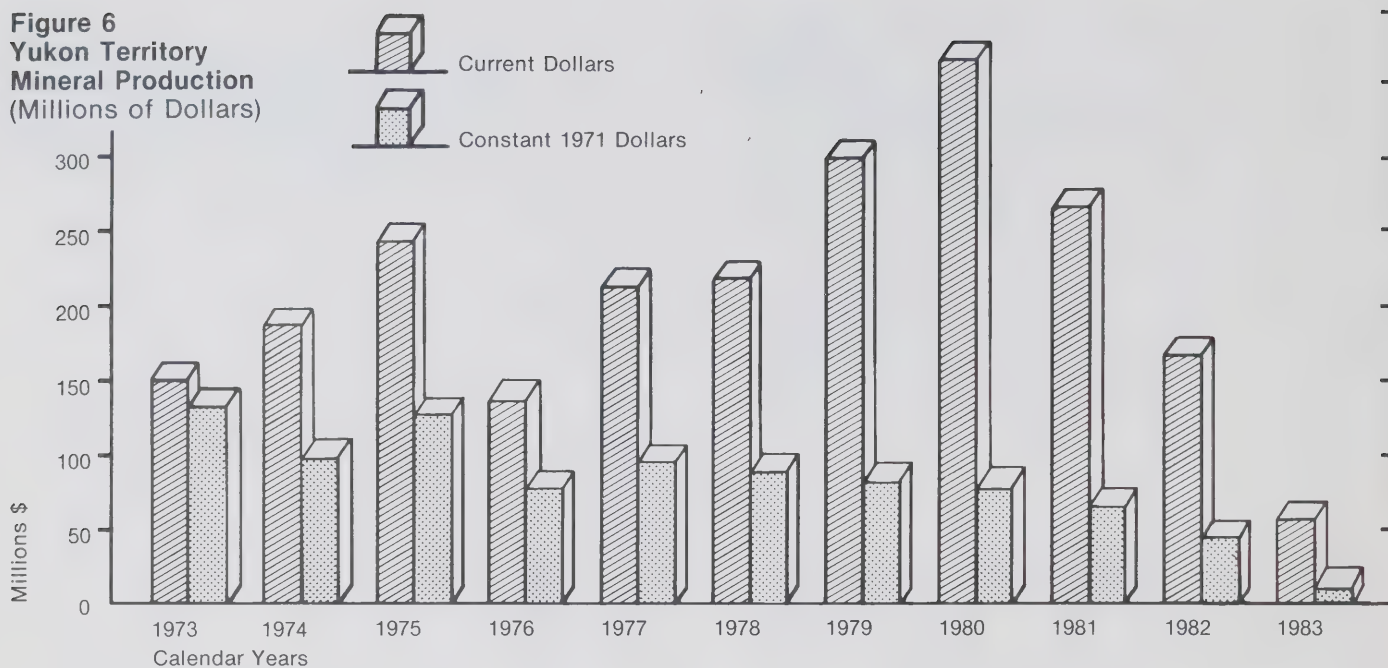
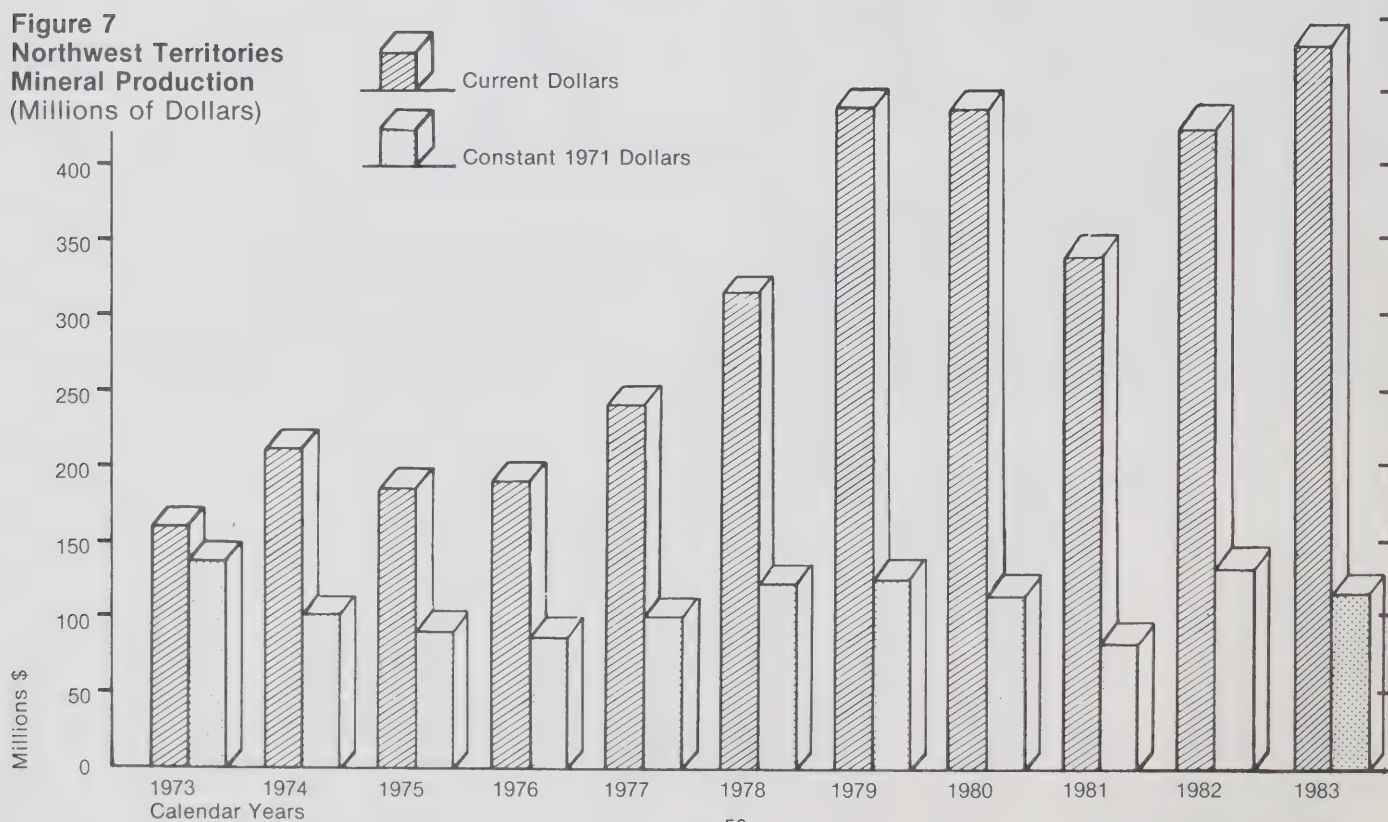


Figure 7
Northwest Territories
Mineral Production
 (Millions of Dollars)



Appendix 2

Organizational Structure and Mandate

As of October 1984, the Minister and departmental officers responsible for the administration of mines and mineral resources in the Northwest Territories and the Yukon were:

Minister:	David E. Crombie
Deputy Minister:	M.A.J. Lafontaine
Assistant Deputy Minister (Northern Affairs):	G.N. Faulkner
Director General, Northern Resources and Economic Planning:	R.D. Glass
Acting Director, Mining Management and Infrastructure:	Dr. J. Lazarovich
Assistant Director, Mining Administration:	J.M. Hodgkinson
Head, Mining Resources Section: Evaluation Geologist: Technical Information Officer:	Dr. D.D. Brown T.W. Caine P.T. Marion
Head, Mining Lands Section: Head, Legislation: Head, Royalties: Administration Clerk:	T.W. Dent P.M. Corrigan M.A. Fish N. Horton
Acting Assistant Director, Mineral Policy:	J. Fraser
Acting Assistant Director, Infrastructure:	W.G. Cleghorn

Address:

Department of Indian Affairs
and Northern Development
Les Terrasses de la Chaudière
OTTAWA, Ontario
K1A 0H4

Phone (Mining) (819) 997-0911

Northern Affairs Program

Yukon Region

Director General	M.J. Morison
Director, Mineral Resources:	C. Ogilvie
Chief Geologist:	Dr. J.A. Morin
District Geologist:	J.G. Abbott
Placer Geologist:	S. Morrison
Staff Geologists:	K.J. Grapes D. Emond
Regional Manager, Mineral Rights: Mining Recorders:	B.R. Baxter D.F. Jennings, Whitehorse B. Proudfoot, Dawson R.G. Ronaghan, Mayo P. McLeod, Watson Lake
Regional Mining Engineer: District Mining Engineer: Mine Rescue Superintendent: Environmental Technician:	C.H. Macdonald N. Prasad N. Mainer D. Cormier

Chief Claim Inspector:	G. Gilbert
Mining Claim Inspectors:	L. Olynyk R. Whittingham

Address:

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and Northern Development
200 Range Road
WHITEHORSE, Yukon
Y1A 3V1

Phone (switchboard) (403) 668-5151

Northern Affairs Program

Northwest Territories Region

Director General:	P.H. Beaubier
Director, Minerals and Economic Analysis:	G. Patenaude
Chief Geologist:	Dr. W.A. Padgham
District Geologists:	Dr. W.A. Gibbins P.J. Laporte C.C. Lord J.M. Seaton
Staff Geologist:	J.A. Brophy
Archive Geologist:	C. Ellis
Project Geologist:	Vacant
Regional Manager, Mining Lands:	E.D. Cook
Mining Recorders:	H.B. Mercer T. Miedema

Address:

Department of Indian Affairs
and Northern Development
P.O. Box 1500
YELLOWKNIFE, Northwest Territories
X1A 2R3

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Department of Indian Affairs and Northern Development

The Department of Indian Affairs and Northern Development (DIAND) is responsible for the administration of all mines and mineral activities in the Yukon and Northwest Territories. DIAND, as part of the federal government, administers the policy and legislative instruments which govern the mining industry in both territories.

Within DIAND's Northern Affairs Program, major functional groups, which deal directly with the mining industry, are the Northern Resources and Economic Planning Branch and the Northern Environment Branch at Headquarters, and the Regional Northern Affairs Program Branches in the Yukon Region and Northwest Territories Region.

The Northern Resources and Economic Planning Branch at Headquarters consist of three directorates: Northern Economic Planning, Oil and Gas Management and Major Projects, and Mining Management and Infrastructure. This branch is accountable for the development of departmental strategies, policies, legislation, plans and programs related to northern economic development, including the development and management of non-renewable resources and northern economic infrastructure. In addition, the Branch has a head-quarter's function in the co-ordination of federal and territorial activities in the area of northern economic resource development and departmental policies and mechanisms to provide socio-economic development and benefits.

In 1982, the Northern Resources and Economic Planning Branch underwent a re-organization which resulted in the establishment of the Mining Management and Infrastructure Directorate, integrating the Transportation and Communications Division, Northern Roads and Airstrips Division, Non-Renewable Resources Development Division and the Mining Division. The Mining Management and Infrastructure Directorate brings the mining and infrastructure elements of the Northern Program together to give co-ordination on issues related to mineral policy, mineral resources, mining industry development, mining legislation and infrastructure support.

The Mining Management and Infrastructure Directorate develops and administers federal northern mineral policy and legislation, assesses infrastructure requirements of existing and potential resource operations requiring roads, airstrips and other transportation modes, and administers mining and mineral rights. The Directorate consists of the Mining Administration Division, the Mineral Policy Division and the Infrastructure Division.

Mining Administration Division

The Mining Administration Division develops policy related to the regulation of the Northern mineral industry, which includes providing for the consultative process with industry and initiating and drafting of appropriate acts, regulations and policy documents related to the disposition and to the administration of mineral rights in the Yukon Territory and Northwest Territories. The Division administers the royalty provisions of the *Yukon Quartz Mining Act*, *Canada Mining Regulations* and *Territorial Coal Regulations*. The Division advises and negotiates with various government agencies whose responsibilities interface with mining in the Territories, provides information on current and proposed exploration and mining developments and maintains a microfiche library of assessment reports, geological reports and other mineral resource information.

Mineral Policy Division

The Mineral Policy Division develops policies and plans to promote the orderly management and development of mineral resources in the Yukon and Northwest Territories. In support of these activities, it conducts studies and investigations of the economic aspects of mineral industry operations. Similar studies and investigations are also carried out to assess proposed major new mine

developments in the Territories and to monitor existing operations. A major activity of the Division, together with Mining Administration Division and Infrastructure Division, at present, is the development of a northern mineral policy to guide mineral development in the Territories over the next decade. Although only the preliminary phases of policy development have been completed, the Minister has stated that he would like to address such issues as the role of mining in the northern economy, the involvement of native people, the provision of infrastructure, the creation of a favourable investment climate through the maintenance of an appropriate fiscal and regulatory regime and the establishment of an appropriate balance between people, minerals and the environment.

Infrastructure Division

The Infrastructure Division is responsible for policy, assessing, planning, programming and funding of infrastructure requirements in the North including roads, airstrips and other transportation modes within the general framework of northern development strategies, policies, plans and programs for northern economic development. The Division provides overall management for the Northern Roads Program. In addition, it manages the Northern Resource Roads Program under which the Department enters cost sharing agreements with industry for the construction of initial and permanent access roads.

Regional Offices – Yukon and Northwest Territories

The Yukon Region Branch and Northwest Territories Region Branch of the Northern Affairs Program are major functional groups, which under the direction of regional Directors General, administer the mandate of the Program and the provisions of mining legislation and regulations within the respective Territories. Offices are located at Whitehorse, Y.T. and Yellowknife, N.W.T.

The Regional Branches have the following sub-units: Mining Lands Section, Geological Services Sections and a Mining Inspection Section (in the Yukon only).

Mining Lands Sections

The Mining Lands Section in the Yukon and Northwest Territories administrative offices have been divided into seven mining districts. A mining recording staff is responsible for the disposition of mineral rights within each district in accordance with applicable legislation. There is a Supervising Mining Recorder in each territory, whose principal function is to ensure that the regulatory requirements are followed in the administration of the various mining acts and regulations.

Geological Services Sections

Geological Services Sections publish geological reports and maps and provide geological services to the mineral industry in both Territories. Offices are maintained at Whitehorse and Yellowknife. Two core libraries, the H.S. Bostock Library in Whitehorse and the C.S. Lord Library in Yellowknife preserve diamond drill core.

Each core library has laboratory facilities for core splitting, diamond-saw cutting, thin section preparation and core storage. Regional and district geologists conduct mineral property examinations, collect rock and mineral specimens and advise the mineral industry, government departments and research scientists on geological and exploration matters. Department geologists assist prospectors in identifying rock and mineral specimens, by conducting prospector training courses and preparing geological compilation maps on mineralized areas.

Mining Inspection Section

In the Yukon, the Mining Inspection Section gives advice on the *Mining Safety Ordinance* and *Mine Safety Regulations* of the Yukon Territory as well as the *Blasting Ordinance and Regulations of the Yukon Territory*.

It also prepares new safety legislation when required. A regional mining engineer is stationed at Whitehorse. This senior mining engineer has a staff consisting of a district engineer, an electrical-mechanical engineer, an environmental engineer, a mine rescue superintendent, three claim inspectors and a clerk.

The Section is responsible for the following: inspection of mines, quarries and blasting operations to ensure compliance with safety legislation; inspection of mineral claims to ensure compliance with the *Yukon Quartz Mining Act* and the *Yukon Placer Mining Act*; ensuring that sufficient mine personnel are trained in mine rescue, recovery operations and first aid; conducting ventilation and dust surveys; monitoring radioactive contamination, and carrying out environmental studies at underground and surface mining properties.

Colony	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
Alabama	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Alaska	0	0	0	0	0	0	0	0	0	0	0
Arizona	100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000	1,000,000	1,100,000
Arkansas	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
California	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Colorado	100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000	1,000,000	1,100,000
Connecticut	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Delaware	100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000	1,000,000	1,100,000
District of Columbia	100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000	1,000,000	1,100,000
Florida	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Georgia	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Hawaii	0	0	0	0	0	0	0	0	0	0	0
Idaho	100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000	1,000,000	1,100,000
Illinois	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Indiana	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Iowa	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Kansas	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Kentucky	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Louisiana	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Maine	100,000	200,000	300,000	400,000	500,000	600,000	700,000	800,000	900,000	1,000,000	1,100,000
Maryland	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Massachusetts	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Michigan	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,000	2,400,000	2,600,000	2,800,000	3,000,000
Minnesota	1,000,000	1,200,000	1,400,000	1,600,000	1,800,000	2,000,000	2,200,00				

[illegible]

Source: Ethical College, 2005; Faculty Affairs and Executive Planning Institute (NAACAC), 2004.

(1) Probability Functions, (2) Interval Functions

Document de la politique ministérielle, Énergie, Mines et Ressources et de l'économie du Nord Canada
9 chiffres, 1980-81, du 1980-81

Table 10, Mineral Production – 1974-1983
Tableau 10, Production des minéraux – 1974-1983

Northwest Territories – Territoires du Nord-Ouest										
Mineral Minéraux	1974	1975	1976	1977	1978	1979	1980	1981	1982(R)	1983(P)
Gold – Or g – gr	\$ 28 651 414 5 737 565	28 754 047 5 460 651	24 390 081 6 162 252	31 336 428 6 204 583	45 769 718 6 458 948	61 868 488 5 355 926	96 920 000 4 209 000	85 495 000 4 825 000	91 415 000 6 113 000	153 067 000 9 128 000
Silver – Argent g – gr	\$ 17 669 851 118 728 409	8 883 385 61 319 168	14 343 774 103 794 822	18 716 934 118 325 557	23 854 173 120 237 000	34 770 651 83 358 000	41 331 000 53 000 000	13 465 000 33 000 000	16 073 000 51 000 000	22 993 000 51 000 000
Copper – Cuivre kg – kg	\$ 840 719 491 923	526 889 374 885	639 980 424 469	445 850 291 959	518 993 315 624	941 732 397 191	679 000 262 000	613 000 277 000	419 000 215 000	
Lead – Plomb kg – kg	\$ 34 932 761 76 524 844	37 254 292 83 390 558	26 440 157 52 942 453	40 833 313 58 832 599	56 898 673 70 088 814	80 117 935 60 645 969	55 853 000 51 337 000	44 680 000 45 522 000	46 367 000 63 955 000	40 444 000 68 491 000
Zinc – Zinc kg – kg	\$132 251 480 171 886 138	106 650 304 129 002 037	122 438 035 147 610 457	125 104 245 159 709 355	143 911 352 187 809 913	205 600 051 213 323 454	172 556 000 175 685 000	159 764 000 133 604 000	229 110 000 213 523 000	257 069 000 223 538 000
Cadmium – Cadmium kg – kg	\$ 137	1 027 137	3 179 549	2 677 386						
Tungsten Trioxide – Trioxyde de tungstène kg – kg	1 613 700	1 477 731	2 168 154	2 284 409	2 885 619	3 254 067	4 007 000	2 515 000	2 925 000	1 491 000
Tungsten and Arsenic Trioxide – Tungstène et trioxyde d'arsenic	\$					53 675 858	68 119 000	93 005 000	42 215 000	17 583 000
Sand and Gravel – Sable et gravier	\$ t								41 482 000 6 625 000	39 780 000 6 000 000
Stone – Pierre	\$ t								1 268 000 323 000	1 245 000 300 000
Total	\$214 346 225	182 069 944	188 255 206	216 439 447	270 952 909	436 974 715	435 458 000	397 022 000	468 349 000	532 181 000

Source: Mineral Policy Sector, Energy, Mines and Resources and Northern Resources and Economic Planning, Indian Affairs and Northern Development.

(P) Preliminary Figures, (R) Revised Figures

Secteur de la politique minière, Énergie, Mines et Ressources et Planification des ressources et de l'économie du Nord, Affaires indiennes et du Nord Canada

(P) chiffres provisoires (R) chiffres révisés.



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Affairs Canada

Affaires indiennes
et du Nord Canada

Mines and Mineral Activities 1984

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-M35



Canada

Mines and Mineral Activities 1984

Northern Affairs Program



The N-81 open pit, with reserves of 2.72 million t grading 14 per cent zinc and 7 per cent lead, began production in July, 1984. Photo courtesy Pine Point Mines Ltd./Cominco Ltd.



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Minister of Supply and Services Canada

Introduction

This report covers mines and mineral activities for the Yukon and Northwest Territories for the calendar year 1984.

The report was written and compiled by *T.W. Caine* and *D.D. Brown* of the Mining Resources Section, Ottawa. Sections on mineral exploration were based on exploration overviews produced by regional geological staff under the direction of J.A. Morin in the Yukon and W.A. Padgham in the Northwest Territories.

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Executive Summary

Yukon

Mineral shipments (reported by Statistics Canada as "mineral production") in the Yukon Territory during the calendar year 1984 were valued at \$61.9 million compared with \$62.9 million in 1983. Gold production from 186 Yukon placer gold operations accounted for an estimated \$44.2 million or 71.4 per cent of production value, while silver production from *United Keno Hill Mines* and four seasonal small-scale silver producers accounted for \$15.3 million or 24.8 per cent of total mineral production value. The Yukon's hardrock mining industry continued in a state of severe recession following the decline of base metal prices in 1982 and the suspension of lead-zinc production at *Cyprus Anvil's* Faro Mine since June 1982.

Precious metals accounted for 98.6 per cent of Yukon's metallic mineral production value in 1984. The leading sector of the mining economy was the placer gold mining industry with gold production declared for royalty payments amounting to 2 946 kg valued at \$44.2 million in 1984, compared with 3 008 kg valued at \$50.3 million in 1983. *United Keno Hill Mine's* operations at Elsa produced 32 t of silver out of the Yukon total of 44 t of silver valued at \$15.3 million. The other silver producers were seasonal small-scale, high-grade, open-pit producers. *Archer, Cathro and Associates (1981) Ltd.* mined both the Sadie Ladue vein, in the Keno Hill area and the Kane property near Dalton Post; *Springmount Operating Company* mined the old Silver Spring and the Mount Keno mines, both in the Keno Hill area; *Dawson Eldorado Gold Exploration Ltd.* and *Silver Crest Resource Corporation* mined the Plata and Inca claims in the Hess Mountains.

Cyprus Anvil Mining Corporation operated a waste rock stripping program over its Faro lead-zinc-silver deposit during the year. However, operations were suspended on October 28, 1984, because of a lock-out of union workers. Re-opening of the Faro Mine is dependent upon the implementation of cost efficiencies and the resolution of transportation and labour issues. The Government of Canada is assisting *Cyprus Anvil* to resolve these issues and to help *Dome Petroleum Ltd.* sell its 87.5 per cent interest in *Cyprus Anvil Mining Corporation*.

Exploration in 1984 was centred on precious metal deposits. An estimated \$21 million to \$23 million was spent on exploration in 1984, compared with \$12 million in 1983. Much of the activity was centred in the Dawson Range northwest of Carmacks for gold, in the Wheaton River-Montana Mountain area, (southwest and south of Whitehorse, where young volcanic rocks host the Mount Skukum gold and Venus gold-silver deposits), in the Teslin-Rancheria area in southern Yukon for tin and tungsten, in the Elsa area for silver and gold and in the Dawson area for gold.

Northwest Territories

Mineral shipments in the Northwest Territories during the calendar year 1984 were valued at \$781 million compared with \$557 million in 1983 for an increase of \$224 million. This increase was largely due to the 1984 increase in values of zinc, gold and tungsten production over the previous year. The value of gold production increased by \$42.6 million and the value of zinc production increased by \$156.4 million.

Combined shipments from the Northwest Territories' three zinc-lead mines, Pine Point, Polaris and Nanisivik, increased 29 per cent to 303 000 t of zinc and declined 3.4 per cent to 78 400 t of lead in 1984. Mine-reported productivity increased substantially over the previous year for both zinc (38.6 per cent increase to 341 595 t) and lead (34.4 per cent increase to 86 528 t). Marginally improved zinc and lead prices during 1984 and a full year of production at Pine Point resulted in an increase in zinc shipment value of 58 per cent to reach \$426 million in 1984 and an increase in lead shipment value of 20.4 per cent to reach \$58 million in 1984.

Gold shipments increased 31 per cent from 8 634 kg of gold in 1983 to 12 400 kg in 1984. The value of gold output increased from \$144.6 million in 1983 to \$187 million in 1984 notwithstanding lower gold prices received by producers in 1984. Most of the production increase was accounted for by *Echo Bay's* Lupin Mine, *Cominco's* Con Mine and *Giant Yellowknife's* Salmita Mine. In addition, *Royex's* Shear Lake gold mine came on stream during the year.

Because of low silver prices, *Terra Mines Limited* cut back mine production. Including production from *Terra*, a primary silver producer, *Nanisivik* and other byproduct producers, silver production declined by 32 per cent. The corresponding value of silver output declined by 48 per cent from \$33.7 million in 1983 to \$17.6 million in 1984.

Canada Tungsten Mining Corporation (Cantung) resumed operations in November 1983 and operated during 1984 despite low tungsten prices. Cantung's mine production increased 1 008 per cent over the previous year to reach 3 529 t of tungsten trioxide (WO_3) valued at \$42 million.

Exploration in 1984 was centred on gold deposits with activities concentrated in greenstone belts of Slave Structural Province between Great Slave Lake and Coronation Gulf. An estimated \$32 million was spent on exploration in the Northwest Territories in 1984, compared with \$18 million during 1983. Among exploration highlights, *Echo Bay Mines Ltd.* announced a promising gold discovery on the Kim claims near Indin Lake, 184 km north-northwest of Yellowknife. Also, *Urangesellschaft Limited* reported the discovery of two additional mineralized uranium zones on its Lone Gull property, west of Baker Lake, where reserves amount to 16.78 million kg of uranium oxide (U_3O_8).

Trends in the value of Northern Mineral Production

(by F.I. Hill, Economic Strategy Division)

The following graphs show the trend in the value of mineral production in the Northwest Territories and Yukon since 1971, excluding fuels and structural materials. The series includes an estimate of the value of tungsten trioxide before 1981, the first year in which the official data included tungsten values. In keeping with standard practice, production values for metallic minerals represent the value of recovered metal in smelter and refinery returns, rather than the value of the products in the form in which they are shipped from the territories.

The **current price series** for each territory revealed a strong upward trend until 1980, although the effect of the prolonged strike at *Cyprus Anvil* in 1976 is apparent in the Yukon graph. The downward trend in the Yukon since 1981, however, contrasts sharply with the impressive performance of the mineral sector in the Northwest Territories.

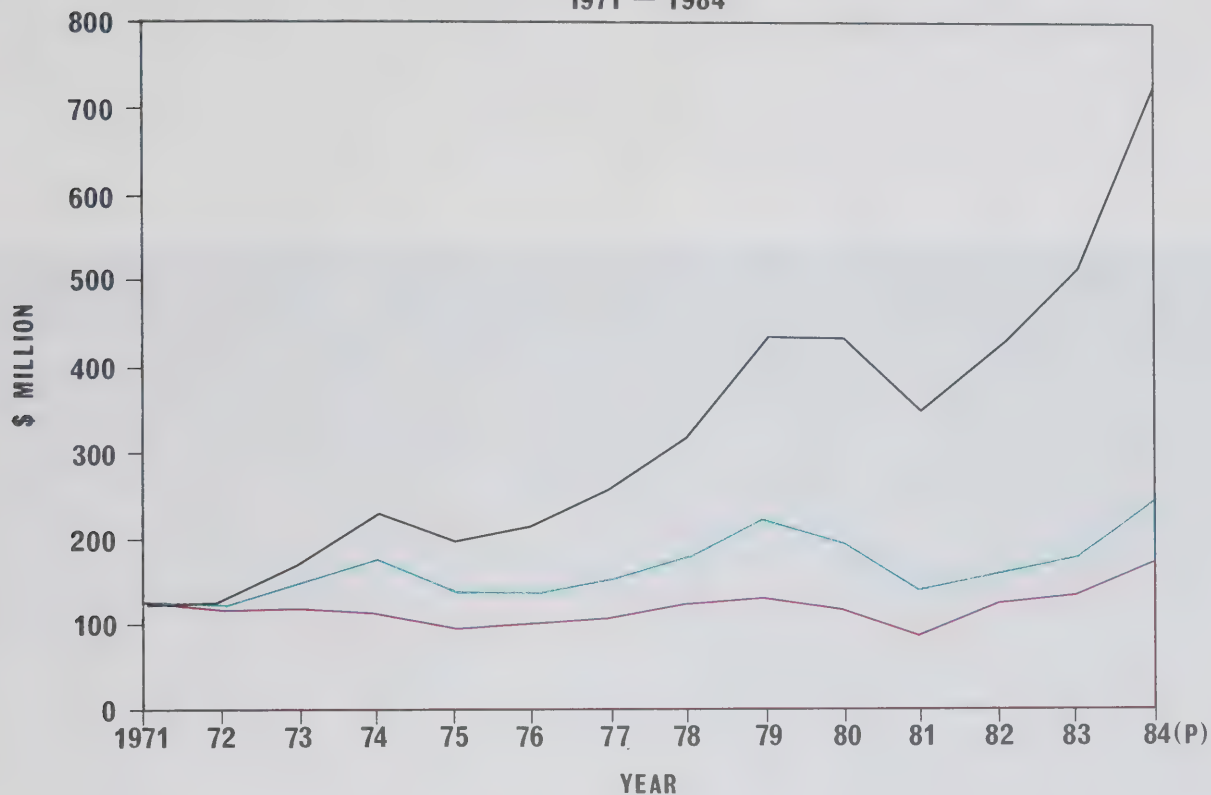
The current price series is affected by changes in mineral prices as well as volumes of production. The **constant (1971) price series** reflects only the quantity of minerals produced and is, therefore, a volume indicator. The value for a particular year is derived by multiplying the quantity of each mineral produced by the price for that mineral commodity in 1971, and then summing these values for all minerals. This series indicates that in both territories the great increase in the value of production during the 1970s was attributable to higher mineral prices, not to increased production. In fact, the quantity of most mineral commodities produced in the North was less in 1981 than 1971. Copper and tungsten were the only exceptions. However, since 1981, production volumes in the Northwest Territories have been on an upward trend, while those in the Yukon have trended sharply downwards, although the quantity of gold produced in both the Yukon and N.W.T. has increased.

The **constant (1971) dollar series** is obtained by deflating current production values using the Gross National Expenditure implicit price index. During the 1970s, the prices of minerals produced in the North increased more rapidly than prices generally in Canada. The value of mineral production according to the constant (1971) dollar series on the graphs, therefore, is consistently higher than the constant price series. Because mineral commodity prices have generally trended downwards since 1980, there has been some convergence of the constant dollar and constant price series.

The preliminary estimate of the value of mineral production in constant (1971) dollars in the Northwest Territories in 1984 was 77 per cent above the value in 1971. For the Yukon the 1984 estimate was only 20 per cent of the 1971 value, indicating the sharp decline in mineral production from Yukon lode mines since 1982. The contrast between the trends in the two territories is especially apparent for the period since 1981. By 1984, the value of production in the N.W.T. in constant dollars had surpassed the previous peak reached in 1979.

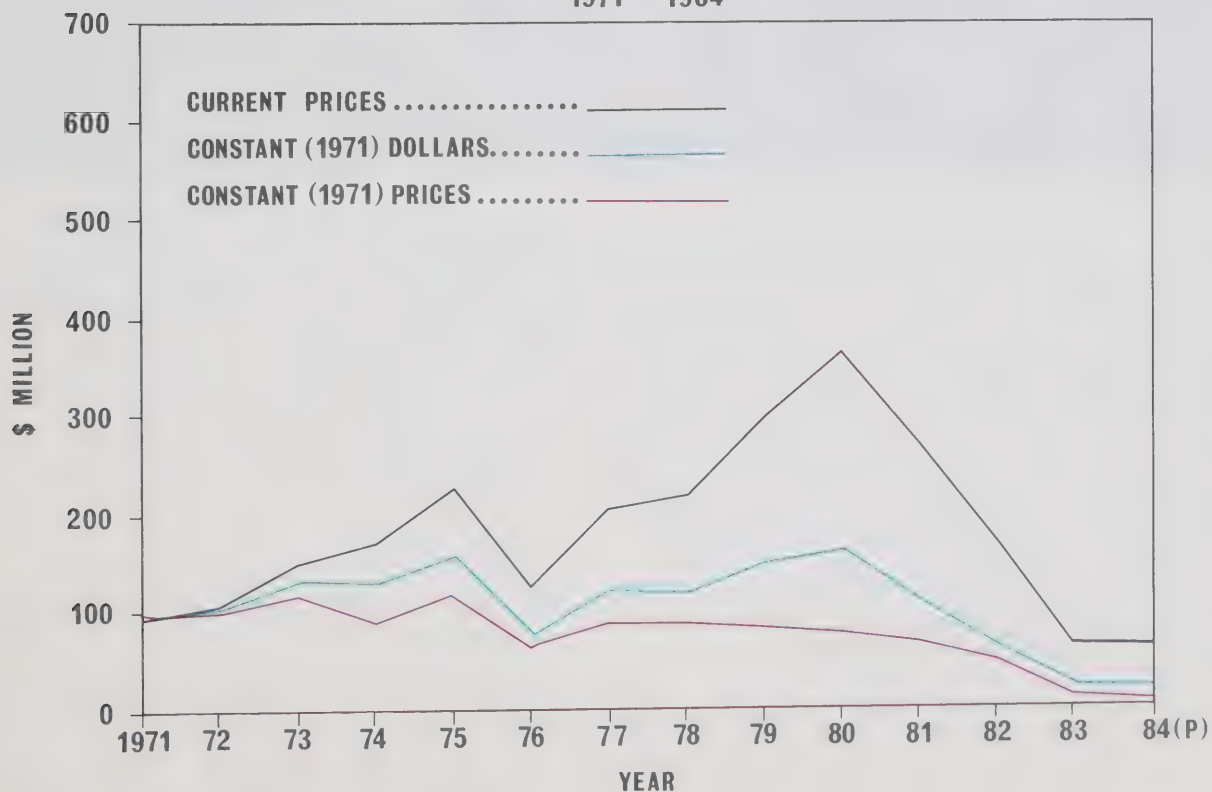
VALUE OF MINERAL PRODUCTION - N.W.T.

1971 - 1984



VALUE OF MINERAL PRODUCTION - YUKON

1971 - 1984





Echo Bay is one of the few North American mining companies to extensively use electric hydraulic drilling equipment, here being used for production drilling in the Lupin Mine. Photo courtesy Echo Bay Mines Limited.

Mines and Mineral Activities

Northwest Territories

Mineral Production

Mineral shipments¹ in the Northwest Territories during the calendar year 1984 was valued at \$781 million compared with \$557 million in 1983 for an increase of \$224 million. This increase was largely due to the 1984 increase in values of zinc, gold and tungsten production over the previous year. The value of gold production increased by \$42.6 million and the value of zinc production increased by \$156.4 million.

Gold production remained the bright spot in the industry, with a 43.6 per cent increase in production over the previous year to reach 12 400 kg of gold and a 30 per cent increase in value to reach \$187 million in 1984. However, the decline in the price of gold to \$300 U.S. per troy ounce, at year's end, reduced the operating profits for some operators to marginal levels. Base metal production increased substantially. Combined mine-reported production of the Northwest Territories' three zinc-lead mines, Pine Point, Polaris and Nanisivik, increased 37.7 per cent to 341 595 t of zinc and 86 528 t of lead in 1984. The productivity increase resulted from resumption of year-round operations at Pine Point combined with improved zinc and lead prices. This resulted in an increase in zinc production (sales) value of 58 per cent to \$426 million in 1984 and an increase in lead production (sales) value of 20.4 per cent to \$58 million in 1984. The calculated value of tungsten mine production increased to \$42 million despite continued low tungsten prices. Shipments increased 213 per cent in 1984 over the previous year during which 776 t were sold from inventory. However, the amount of tungsten trioxide produced at the mine increased 1 008 per cent to 3 528 t as *Canada Tungsten Mining Corporation* operated its Cantung Mine throughout 1984 following a 10-month shutdown in 1983. The value of silver production declined by 48 per cent to \$17.6 million in 1984, because of lower silver prices and a cut-back in production at *Terra Mines'* three silver mines.

Ore from thirteen mines at ten mine establishments were treated at ten mills in the Northwest Territories during 1984. The silver ore from *Terra Mines'* Silver Bear, Norex and Smallwood mines were treated at the Silver Bear Mill and gold ore from *Royex Gold Mining's* B Zone Mine (Cullaton Lake Mine) and the

newly commissioned Shear Lake Mine were treated at the Cullaton Lake Mill. A summary of mineral production from these mines during 1983 and 1984 is given in Table 3.

Table 1
Mineral Production of Operating Mines,
Northwest Territories, 1983 and 1984

Company, Mine and Commodity	1984		1983	
	t	kg	t	kg
<i>Canada Tungsten Mining Corp. Ltd.</i>				
tungsten trioxide	3 528		350	
<i>Cominco Ltd.</i>				
<i>Con Mine</i>				
gold		2 772		2 219
silver		554.4		460
arsenic trioxide	1 269		250	
<i>Polaris Mine</i>				
zinc	110 483		117 630	
lead	28 439		34 623	
<i>Echo Bay Mines Ltd.</i>				
<i>Lupin Mine</i>				
gold		5 645.6		3 758
silver		820		287
<i>Giant Yellowknife Mines Ltd.</i>				
<i>Giant Mine</i>				
gold		1 997.4		1 963
silver		340.8		552
arsenic trioxide	3 415		732	
<i>Salmita Mine</i>				
gold		1 381.1		165
silver		262.4		32
<i>Nanisivik Mines Ltd.</i>				
zinc	67 682		61 042	
lead	6 996		6 396	
silver		27 061		26 225
<i>Pine Point Mines Ltd.</i>				
zinc	163 430		67 643	
lead	51 093		23 203	

¹ Statistics Canada reports "mineral shipments" from the mine establishments as "mineral production"

Table 1 (continued)
Mineral Production of Operating Mines,
Northwest Territories, 1983 and 1984

Company, Mine and Commodity	1984		1983	
	t	kg	t	kg
<i>Royex Gold Mining Corp.</i>				
<i>B Zone and Shear Lake Mines</i>				
gold		872.5		1 147
silver		68.1		24
<i>Terra Mines Ltd.</i>				
silver		24 620.5		46 533
lead	—		181	
zinc	—		118	
copper	—		115	

Sources: Department of Indian Affairs and Northern Development and the Government of the Northwest Territories. These production figures are those reported by the mines as production and may not match Statistics Canada production figures which are based on metals sold or shipped. In the previous editions of this table, Statistics Canada figures were used.

Some 44.6 per cent of Northwest Territories gold production came from *Echo Bay Mines'* Lupin Mine, Canada's second largest individual gold mine. Lupin's mill capacity was expanded from 900 to 1 100 t per day in 1983 and production increased by 1 975 kg of gold to reach 5 645.7 kg in 1984. *Giant Yellowknife's* Salmita Mine completed its first full year of production in 1984 and increased the Northwest Territories' gold output by 1 382 kg. The B-Zone Mine of Royex Gold Mining Corporation, formerly the Cullaton Lake Mine, was mined only during the first half of the year. Royex's Shear Lake Mine, 5 km north of the B-Zone Mine, came on stream in March and produced 423.2 kg of gold. In the Yellowknife area, *Cominco's* Con Mine and *Giant Yellowknife's* Giant Mine together produced 4 769 kg of gold amounting to 37.6 per cent of the Northwest Territories' gold production.

Production from the three zinc-lead mines, Pine Point, Polaris and Nanisivik, together increased 37.7 per cent from the previous year to reach 428 123 t of zinc and lead metal in concentrate. The production increase resulted from the year-round operation of the Pine Point Mine following its reopening in mid 1983 and improved zinc and lead prices.

Production at *Terra Mines'* three silver mines in the Camsell River area, the Norex, Smallwood and Silver Bear mines, declined by 47 per cent compared to the previous year to reach 24 620 kg of silver in 1984. *Terra* cut back production because of low silver prices. Including silver production from the Nanisivik zinc-lead-silver mine and byproduct silver from gold mines, total mine reported silver production declined by 27.5 per cent to reach 53 727 kg of silver in 1984.

Canada Tungsten Mining Corporation resumed year-round production at its Cantung Mine having operated only two months during 1983. Despite continued low tungsten prices during 1984, the mine reported production of 3 528 t of tungsten trioxide (WO₃) with a calculated (\$84 US per Short Ton Unit) value of \$41 980 000.

The mineral industry of the Northwest Territories accounted for 74.8 per cent of the tungsten, 31.4 per cent of the lead, 28.1 per cent of the zinc, 15.3 per cent of the gold and 4.3 per cent of the silver produced in Canada during 1984. The value of metals produced, including tungsten, accounted for 8.5 per cent of the value of Canada's metallic mineral production in 1984 compared with 6.7 per cent in 1983.

Operating mines and mills in the Northwest Territories employed an average of 2 703 persons during 1984.

Mines

Canada Tungsten Mining Corporation Limited

Canada Tungsten Mining Corporation's Cantung Mine (a)* produced 3 528 t of tungsten trioxide (WO₃) contained in scheelite concentrate in 1984 compared with 350 t of tungsten trioxide in 1983. After suspending operations on January 22, 1983, the mine resumed operations on November 28, 1983. The company achieved a 30 per cent reduction in productivity costs and despite manpower reductions, productivity has remained high because of increasing use of blast hole stoping and the vertical crater retreat method. Five drill holes extended from an exploration drift 213 m west of the current workings indicated that ore grade mineralization is still open on

the westerly extension of the Cantung deposit. It is intended to extend an exploratory drift a further 365 m to the west in 1985.

Type:	Underground
Location:	Tungsten
Product:	Tungsten in scheelite concentrate
Mill Capacity:	1 000 t per day
Tonnes Milled:	321 633 (881 tpd)
Reserves:	2.54 million t (Dec. 31, 1984)
Reserve Grade:	1.39 per cent WO ₃
Employees:	205

Cominco Limited – Con Mine

Cominco Ltd.’s Con Mine (c) milled 223 560 t of ore to produce 2 772 kg of gold and 544.4 kg of silver in 1984, compared with 191 851 t of ore and 2 219 kg of gold and 460 kg of silver in 1983. The lower output in 1983 was due to a two-month strike.

The company started a \$10-million program to deepen the Robertson Shaft by 247 m to 1 900 m depth and develop four new working levels. The project is scheduled for completion in 1985. Ore reserves are sufficient for a 9 to 10 year mining period.

Type:	Underground
Location:	1.4 km south of Yellowknife
Product:	Gold, silver
Mill Capacity:	590 t per day
Tonnes Milled:	223 560 (612 tpd)
Reserves:	1.542 million t (Dec. 31, 1984)
Reserve Grade:	14.4 g/t gold
Employees:	372

Cominco Limited – Polaris Mine

Cominco’s Polaris zinc-lead mine (i) on Little Cornwallis Island concluded its second full-year of operation in 1984. Concentrate containing 110 483 t of zinc and 28 439 t of lead was produced in 1984 compared with 117 630 t of zinc and 34 623 t of lead during 1983. A new production area in the South Keel Zone was opened during the year.

Type:	Underground
Location:	100 km northwest of Resolute
Product:	Zinc, lead
Mill Capacity:	2 100 t per day
Tonnes Milled:	846 466 (2 319 tpd)
Reserves:	19.96 million t (Dec. 31, 1984)
Reserve Grade:	14.3% zinc and 3.8% lead
Employees:	272

Echo Bay Mines Ltd. – Lupin Mine

Echo Bay’s Lupin Gold Mine (g) completed its second full year of production during 1984 following an expansion of mill capacity from a rated capacity of 860 to 1 030 t per day in 1983. Lupin’s production increased substantially as mill throughput in 1984 averaged 1 345 t per day for 490 975 t, compared with 331 218 t in 1983. Production in 1984 amounted to 5 645.6 kg of gold and 820 kg of silver, compared with 3 758 kg of gold and 287 kg of silver in 1983. The Lupin Mine became Canada’s second largest individual gold mine. The company commenced a project to deepen its shaft from 369 m to 610 m to ensure sufficient underground development following expansion of the mill in 1983. The project will cost \$16 million and will be completed in 1987.

During the winter of 1983, *Echo Bay* constructed a winter road, extending approximately 600 km, from the Lupin Mine to Yellowknife. A total of 700 truck-loads of fuel and supplies were transported over the road.

Type:	Underground
Location:	400 km northeast of Yellowknife
Product:	Gold, silver
Mill Capacity:	1 030 t per day
Tonnes Milled:	490 975 (1 345 tpd)
Reserves:	3 141 309 t (Dec. 31, 1984)
Reserve Grade:	12.21 g/t gold
Employees:	359

Giant Yellowknife Mines Limited – Giant Mine

Production at *Giant Yellowknife Mines'* Giant Mine (c) remained steady during 1984 with an output of 1 997.4 kg of gold and 340.8 kg of silver, compared with 1 963 kg of gold and 552 kg of silver in 1983. During 1983 Giant commenced a policy to reduce its mill throughput tonnage by 25 per cent to extend the life of mine ore reserves.

Giant conducted an active exploration program on company properties within the Yellowknife greenstone belt during the year. Diamond drilling about 1.6 km north of the *Supercrest Mine*, which is adjacent to the Giant Mine, outlined approximately 36 000 t of possible gold ore at an unspecified grade. Most of the ore zone is located in the property of *Supercrest Mines Ltd.*, jointly owned by *Giant Yellowknife Mines Limited* (50.01 per cent) and *Akaitcho Yellowknife Gold Mines Ltd.* (49.99 per cent).

Type:	Underground
Location:	2.4 km north of Yellowknife
Product:	Gold, silver
Mill Capacity:	1 000 t per day
Tonnes Milled:	295 334 (809 tpd)
Reserves:	958 894 t (Dec. 31, 1984)
Reserve Grade:	8.23 g/t gold
Employees:	305

Giant Yellowknife Mines Limited – Salmita Mine

Giant Yellowknife completed the first full year of production at its high-grade Salmita Mine (e) during the year. Mill capacity at the Tundra mill, located 5 km south of the Salmita Mine, was increased from 150 t per day to 185 t per day when a larger ball mill was installed during the second quarter. The mill processed 55 069 t of ore to produce 1 382.1 kg of gold and 262.4 kg of silver. Reserves at the mine were increased by 29 000 t by drilling below the fourth level.

Type:	Underground
Location:	250 km northeast of Yellowknife
Product:	Gold, silver
Mill Capacity:	185 t per day
Tonnes Milled:	55 069 (150 tpd)
Reserves:	79 832 t (Dec. 31, 1984)
Reserve Grade:	29 g/t gold
Employees:	118

Nanisivik Mines Ltd.

Nanisivik Mines Ltd. (f), controlled by *Mineral Resources International Limited*, milled 692 900 t of zinc-lead-silver ore at the Nanisivik Mine in 1984 compared with 615 561 t in 1983. Concentrate production amounted to 131 700 t containing 67 682 t of zinc and 6 996 t of lead compared with 117 308 t in 1983 containing 61 042 t of zinc and 6 396 t of lead. Higher zinc concentrate production in 1984 was due to milling a larger tonnage of ore compared with the previous year.

Type:	Underground
Location:	Arctic Bay, Baffin Island
Product:	Zinc, lead, silver
Mill Capacity:	1 800 t per day
Tonnes Milled:	692 900 (1 900 tpd)
Reserves:	3.15 million t (Jan. 31, 1985)
Reserve Grade:	9.5% zinc and 0.5% lead
Employees:	201

Pine Point Mines Limited

Pine Point Mines Limited (b), controlled by *Cominco Ltd.*, treated 2 278 900 t of ore at its concentrator to produce 274 821 t of zinc concentrate and 61 676 t of lead concentrate containing 74 000 t of zinc and 17 200 t of lead respectively. Production in 1984 was significantly higher than production in 1983, when the mine was closed from January 2 to June 15, because of low metal prices and high operating costs. The high-grade N-81 open pit mine started production during July with reserves of 2.72 million t grading 14 per cent zinc and 7 per cent lead. Ore from other open pit mines continued to contribute to mill feed, which averaged 7.6 per cent zinc and 2.3 per cent lead. During the year, a decline was driven toward the Y-65 deposit to test underground

mining. The Pine Point operation returned to a profitable position in 1984, as a consequence of greater productivity efforts by the employees, the changeover to larger shovels and trucks and continued cost control measures.

Type:	Open pit
Location:	Pine Point
Product:	Lead, zinc
Mill Capacity:	9 100 t per day
Tonnes Milled:	2 278 900 (6 244 tpd)
Reserves:	21.77 million t (Dec. 31, 1984)
Reserve Grade:	6.0% zinc and 2.7% lead
Employees:	650

Royex Gold Mining Corporation – B-Zone and Shear Lake Mines

Royex Gold Mining Corporation was formed during 1984 as a successor company following the merger of *Cullaton Lake Gold Mines Ltd.* and *Royex-Sturgex Mining Limited*. The company's Shear Lake Mine (h) came on stream in March. It is 5 km north of *Royex's* B-Zone Mine (h) (formerly the Cullaton Lake gold mine). The company's efforts were concentrated on the Shear Lake Mine during the second half of 1984 and the B-Zone mine was mined only during the first half of 1984. Combined ore production from B-Zone and Shear Lake processed at the Cullaton was 139 327 t resulting in 872.5 kg of gold and 68.1 kg of silver.

Type:	Underground
Location:	Cullaton Lake
Product:	Gold, silver
Mill Capacity:	363 t per day
Tonnes Milled:	139 327 (382 tpd)
Reserves:	952 544 t (Shear Lake, March 7, 1985) 81 284 (Cullaton Lake, June 30, 1984)
Reserve Grade:	7.2 g/t gold (Shear Lake) 16.8 g/t gold (Cullaton Lake)
Employees:	147

Terra Mines Ltd.

Terra Mines' three silver mines in the Camsell River area (d), the Norex, Smallwood and Silver Bear mines were operated at a reduced level in 1984 because of low silver prices. Operations were shut down for three months in early 1984 because of high winter operating costs and required repairs to the Silver Bear mill. Silver production in 1984 was 24 620.2 kg from 21 137 t of ore milled compared with 46 533 kg in 1983 from 45 287 t of ore.

Type:	Underground
Location:	Camsell River area, 15 km south of Great Bear Lake
Product:	Silver
Mill Capacity:	364 t per day
Tonnes Milled:	21 137 (58 tpd)
Reserves:	not available
Employees:	75

Development

Amax of Canada Ltd. mined a 200 t bulk sample from the underground development workings of its Mactung tungsten deposit (53), located on the Yukon-Northwest Territories boundary.

Terra Mines Ltd. continued exploration and development work on its TA-Bullmoose Lake gold project (11), 84 km east-southeast of Yellowknife. Work included sinking a decline, underground lateral development and raising, and 15 000 m of diamond drilling. Since April, 1983, Terra has completed over 21 000 m of diamond drilling and 4 300 m of underground exploration development. Contingent on successful results from pilot plant metallurgical work in 1985 and gold prices, Terra may decide to proceed into production at Bullmoose in 1986.

Mineral Exploration

Exploration and development expenditures in the Northwest Territories increased in 1984 to an estimated \$32 million from \$18 million during the previous year. Gold exploration continued to be the leading exploration activity, with most of the effort directed on properties in Slave Structural Province (in MacKenzie District) and in the Rankin-Kaminak volcanic belt (in Keewatin District). The exploration effort for base metals was second and for uranium, third.

The breakdown of total 1984 exploration expenditures by area is: Arctic Islands, \$3.8 million; Keewatin, \$6 million; Slave Province, \$12.5 million; Bear Province, \$1.1 million; Southern Mackenzie (south and east of Great Slave Lake, including Pine Point), \$6.8 million; and Cordillera (Mackenzie and Selwyn mountains), \$2.4 million.

Figure 1
Mineral Exploration Expenditures
Northwest Territories

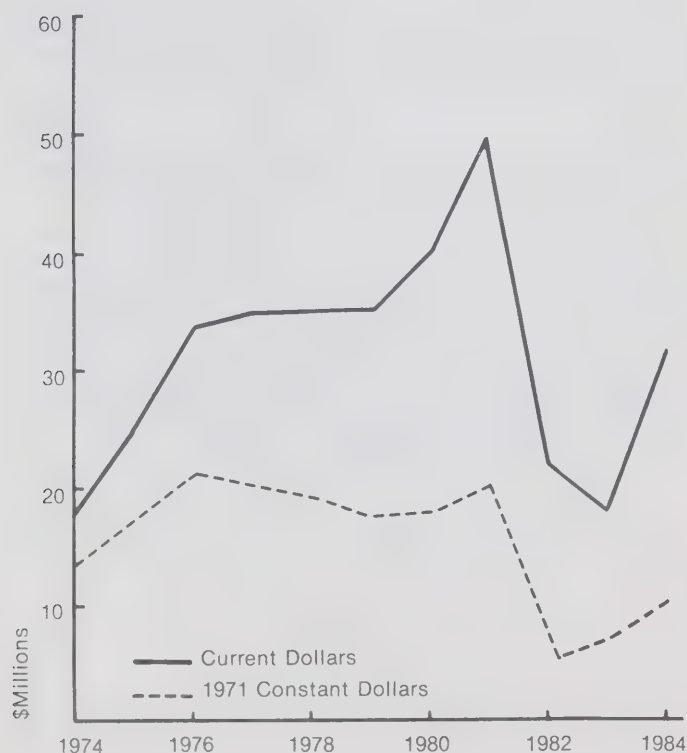


Table 2
Claims Staked in Northwest Territories,
1983 and 1984

Mining District Region	1984		1983	
	Claims Recorded	Area (Thou- sand Hectares)	Claims Recorded	Area (Thou- sand Hectares)
<i>Arctic and Hudson Bay</i>	81		88	
Arctic Islands		27.9		4.0
Keewatin District		21.0		83.9
<i>Mackenzie</i>	395		430	
Slave Province (Northeast Mackenzie)		148.3		218.5
Bear Province (Northern Mackenzie)		0.04		13.3
East Arm Subprovince Pine Point District		0.01		—
Southeast Mackenzie		9.4		0.1
		11.1		—
<i>Nahanni</i>	12		29	
Cordillera		1.3		11.6
TOTAL	488	219.1	547	331.4

Exploration Projects

Gold

Gold Exploration in Slave Structural Province

Ardic Exploration Ltd. explored the Thompson-Lundmark gold mine lease (10) and the adjoining MIK claim by geological and geophysical surveys and by sampling quartz veins.

Back River Joint Venture explored its prospecting permits 973, 1014-1017 (20) by prospecting and geological mapping. The RL 1 claim (23) near Regan Lake was also explored.

Blackridge Gold Ltd. in partnership with *Cruiser Minerals Ltd.* drilled 24 holes totalling 1 200 m on the MQ 001 claim (9) at Gordon Lake. All 24 holes intersected the No. 1 vein which has been traced 120 m along strike. Tonnage and grade estimates, based on 1984 drilling and previous drilling, range from 5 000 t at 30.9 g per t gold to 7 300 t at 21.8 g per t gold, at a cut-off grade of 15.4 g per t.

Bow Valley Industries Ltd. explored a large area in the Contwoyto Lake area (21), mainly to the south of the Lupin mine, in search of gold-bearing iron formation. This area includes claims on which exploration agreements were made with *Aber Resources Ltd.*, *Kappa Resources Ltd.*, *Consort Energy Ltd.*, *Hemisphere Development Corporation* and others. Diamond drilling of the Bow Valley project area included 2 345 m in 28 holes on *Aber Resources'* ground (previously held by *Kappa Resources*). Of the 28 holes, 27 were drilled on the AU 7, BARB 1 and KAP 3 claims southwest of Shallow Bay on Contwoyto Lake. In addition *Bow Valley* drilled 13 holes totalling 1 028 m on *Aber Resources'* FIN claims, 4 holes totalling 336 m on *Hemisphere Development's* AU 10, 16 and 27 claim groups, 2 holes totalling 163 m on *Hemisphere's* AU 1 claim, 4 holes totalling 276 m on *Viscount Resource's* AU 14 claim and 5 holes totalling 288 m on *Great Bear Development Corporation's* AU 3 claim. *Bow Valley* intersected gold values in drill holes on the BARB 1 and FIN claims mentioned above and near Shallow Bay, Contwoyto Lake. Geophysical targets in iron formation were defined by VLF EM (very low frequency electromagnetic survey) and by both magnetometer and gradiometer surveys.

Burnt Island Gold Ltd. drove a decline towards an auriferous quartz zone near an old shaft on Burnt Island, Gordon Lake (9).

Cominco Ltd. drilled south of the Con Mine (c) and near Keg Lake (c) and on the GAS claims (23) on the Back River. *Cominco* also explored the BUGOW claims (8) acquired from *Highwood Resources Ltd.* *Cominco* was a joint venture partner with *Giant Yellowknife Mines Ltd.* and *Roxwell Gold Mines Ltd.* in the exploration of *Roxwell's* BS claims (13), in the Courageous Lake volcanic belt, where an IP (Induced Polarization) survey was completed. *Cominco* also explored the NOD claims located south of the BS claims, that were optioned from *Highwood Resources Ltd.* and another property near *Giant Yellowknife's* Salmita Mine (e), also in the Courageous Lake belt.

Echo Bay Mines Ltd. conducted a large exploration program for gold that covered four main areas of Slave Province. In two of the areas, Bathurst Inlet (19) and Contwoyto Lake to Point Lake (15, 14), the search was for auriferous iron formation. In the remaining two areas, the Indin Lake belt (7) and at *Canuc Resources Ltd.'s* Arcadia property (17), the exploration was directed to gold associated with sulphides and quartz veins respectively. The majority of 1984 exploration expenditures were financed by a \$5 million issue of "flow-through" shares made to Canadian investors in April 1984.

Echo Bay Mines Ltd. announced a promising gold discovery on the KIM claims near Indin Lake (7), 192 km north northwest of Yellowknife. The property was optioned from *Comaplex Resources International Ltd.* and *Petromet Resources Ltd.* *Echo Bay* drilled four holes in a gold-bearing zone along a strike length of 425 m. Six intersections in four holes averaged 5.5 m grading 12.3 g of gold per t. The KIM claims adjoin the northern boundary of the past producing Indin Lake Gold Mine property. *Echo Bay* resumed drilling in January, 1985 to complete "fill-in" holes. At year's end, staking was continuing in the area.

The main thrust of *Echo Bay's* 1984 exploration program was in the Contwoyto Lake area (15), adjacent to the Lupin Mine (g) and thence along a 150 km-long accurate belt underlain by the Contwoyto Formation, which stretches from the Lupin Mine area at Contwoyto Lake through the Itchen Lake area (15) to Point Lake (14).

In the Lupin Mine lease area (g), *Echo Bay* drilled 28 holes totalling 3 056 m. South of the Lupin Mine lease, 10 holes totalling 1 025 m were drilled on the PEN 1 claim.

On the RAFT 1 and SHARE 1 (15) claims, 250 and 309 km west of the Lupin Mine, four holes were drilled on each claim. On the 81K claims (14), 20 drill holes were completed for a total of about 2 000 m. Several grids were laid out on the Contwoyto Formation and surveyed by magnetometer and VLF EM surveys and geological mapping.

The second-largest component of *Echo Bay's* 1984 program consisted of a drill program to test auriferous quartz veins at the Arcadia gold property (17) optioned from *Canuc Resources Ltd.* *Echo Bay* drilled 68 holes totalling about 10 600 m. From north to south across the property the following veins were tested: the Fred Vein (10 holes), the North Vein (45 holes), the Sidewalk Vein (10 holes) and the No. 3 or C Vein (4 holes). Previous drilling in the North Vein outlined 480 000 t grading 10.39 g per t of gold.

Echo Bay also explored for gold on the GRUMPY claims, 35 km southeast of the Arcadia (17) gold property. The company also conducted a small drilling project to test a silver-bearing vein on *Westun Petroleum's* NERAK claim (16) on Coronation Gulf, 50 km west of the Arcadia property.

Frontier Gold Mines Ltd. sampled gold-bearing quartz-carbonate veins exposed in old trenches on the VIDIE and CATHY 1 claims on the south shore of Indin Lake (7) and near Schwerdt Lake respectively.

Giant Bay Resources drilled 4 880 m on the MAHE claims on its gold property at Knights Bay, Gordon Lake (9). A previous calculation gave a drill indicated tonnage of the quartz stockwork deposit at 450 000 t averaging 5.1 g per t gold over a strike length of 124 m. The 1984 drilling extended the mineralized zone along strike and at depth.

Giant Yellowknife Mines Ltd. diamond drilled on the SALERNO 16 and 18 claims of the Salmita gold mine lease (13) and on the RED 24 claims to the north of the Salmita gold mine. *Giant Yellowknife* in joint venture with *Cominco Ltd.* also explored *Roxwell Gold Mine's* BS claims (13) near Matthews Lake by geological mapping and an IP survey.

Goldak Exploration Technology Ltd., as an operator for *Golden Marlin Mines Ltd.*, explored a large block of claims in Yellowknife Bay around the Mirage Islands (c).

Genesis Resources Corporation drilled two diamond drill holes on the BRANDY claims, at Hanson Lake (11). Both holes intersected the Norma Vein but gold values were considerably lower in grade than expected.

Noranda Exploration Company Ltd.'s main exploration project was in the northern part of the Courageous Lake-MacKay Lake volcanic belt. *Noranda* drilled the FAT claims (13) north of the Salmita Mine and explored adjoining ground to the north optioned from *American Chromium Ltd.* A large tonnage, but low-grade, gold deposit has been located. Other areas explored by *Noranda* include claims in the Weaver Lake area (10), where work included drilling and the large SIDD claim block near Uist Lake (22) where zones of auriferous iron formation were found.

Kidd Creek Mines Ltd. explored prospecting Permits 814-818 (24). EM and magnetometer surveys were conducted around a gold showing discovered in 1982 on Permit 814. VLF EM and magnetometer surveys were also conducted on parts of Prospecting Permit 817 and the FOX claims.

W. Knutsen's WT Group claims (9) were explored by *Ryan Energy Corporation* who drilled 1 708 m in 10 holes. Gold values were encountered in seven holes, and widths of nearly 9 m grading 7.1 g of gold per t were indicated. Previous drilling indicated 58 000 t grading between 5 and 6.8 g per t gold.

O.P. Resources Ltd. explored metamorphosed iron formation on the OP claims (15) southeast of the Lupin Mine. Work included a large diamond drilling program.

Silver Hart Mines Ltd. diamond drilled on the BEAR claims near Sunset Lake (12), on the MATE and ALB claims adjoining *Cominco's* GAS claims (23) on the Back River, and on its G and T claims, east of Bathurst Inlet (19). *Silver Hart* also drilled on the FARN and KNUT claim groups (18), west of Bathurst Inlet.

Terra Mines Ltd. continued exploration and development of its Bullmoose Lake (TA claims) gold property (11). Work included sinking a decline, lateral development, raising and about 15 000 m of diamond drilling. Proven, indicated and inferred tonnage in the Main Zone and 11 Zone was estimated at 695 000 t grading 9.64 g gold per t.

Gold Exploration in Rankin-Kaminak Region, Keewatin District.

Aberford Resources Ltd. conducted exploration work including a geophysical survey over a gold showing on its prospecting permit northwest of Imikula Lake (30).

Canadian Nickel Company Ltd. conducted gold exploration along the coast of Hudson Bay south of Rankin Inlet. The company drilled 17 holes totalling 771 m to test a gold-bearing zone in Pork Peninsula (32). The company also mapped, prospected, sampled and geophysically surveyed gossans and iron formation on its prospecting permits north of Wilson Bay and west of Mistake Bay (31). *Canadian Nickel* also conducted geophysical surveys on a gold showing within a prospecting permit held by M. Magrum, west of Maguse Lake (29).

Royex Gold Mining Corporation (formerly *Cullaton Lake Gold Mines*) conducted geophysical surveys, including VLF EM, Max-Min EM, magnetometer and IP surveys on claims adjacent to its producing B-Zone and Shear Lake mines (h). Reverse circulation overburden drilling was performed on these claims. Some 45 000 m of diamond drilling probed previously drilled and newly delineated anomalies in iron formation of the Archean Henik Group. The surveys also investigated areas of fractured Aphebian Hurwitz Group quartzite. The company also prospected permits north of Ameto Lake (28).

Suncor Inc. mapped and conducted geophysical surveys on claims and prospecting permits to the east and west of *Royex Gold Mining Corporation's* properties (27) in the Cullaton Lake area. Diamond drilling, totalling 1 000 to 1 200 m, tested anomalies and showings outlined by the ground surveys.

Gold Exploration in Southeast Mackenzie District

Anaconda Canada Exploration Ltd. explored gold prospects on the SNO and BIRD claims and Prospecting Permit 1011 between Snowbird Lake and Kasba Lake (25). The mineral rights explored are held by *Golden Rule Resources Ltd.*

Gold Exploration in Arctic Islands Region

Borealis Exploration Ltd. conducted grass-roots exploration and examined mineral showings in the Prince Albert Group volcanic belts of Melville Peninsula (33).

Gold Exploration in Nahanni District

Most of the gold exploration in Nahanni District was done by prospectors searching for placer gold. E. and K. Barnes operated a small sluice box on Bordon and Bennett creeks (2), south of the Nahanni River. K. Hebert operated a small portable dredge and sluice box on the Liard River (3), 2 km below Fort Liard. *Hudson Bay Exploration and Development Company Limited* explored its prospecting permits (998-1000) and claims on the Liard River for placer gold (4). E. Linberg tested several gravel bars on the Liard River between Blackstone River and Fort Liard (4). J. Schamanek and companions searched for gold in Diamond 'C', Moose and Grizzly creeks around the Clarke Lake area (2). D. and J. Turner prospected for old gold-bearing gravel bars on the flood plain of the Liard River between the Blackstone River and Nahanni Butte (5).

Gold and Silver Exploration in Bear Structural Province

Valhalla Minerals Inc. drilled 16 Winkie drill holes on the FU claims (6) at Norris Lake, to test auriferous quartz-carbonate veins. *O.P. Resources Ltd.* conducted geophysical surveys over the El Bonanza silver property (59), on the east shore of Great Bear Lake.

Base Metals

Pine Point Mines Ltd., a subsidiary of *Cominco Ltd.*, spent \$3.7 million on exploration during 1984. Most of the expenditures were on drilling and geophysical surveys on the company's mining leases in the Pine Point area (b).

Cominco Ltd. conducted IP surveys on Kalivik Island (35) and on areas near the Polaris Mine and the Eclipse lead-zinc deposit (i) on Little Cornwallis Island. Surface and underground drilling were done in the area of the Polaris Mine.

Nanisivik Mines Ltd. completed geological mapping and geophysical surveys in the areas east (36) and west of the Nanisivik Mine (f). Several anomalies southeast of the mine (37) were drilled with negative results. Total expenditures were estimated at \$1.75 million.

Panarctic Oil Ltd. explored copper-silver prospects in the Natkusiak volcanics on the Diamond Jenness Peninsula (40) and Shaler Mountains (39) of Victoria Island.

Petro-Canada conducted a heavy mineral sampling program on southwestern Ellesmere Island (34) and staked the PEX claim near Elwin Inlet (36), northern Baffin Island.

Prospector Bill Reed and others prospected and trenched pyrite-copper-cobalt showings near Hadley Bay, Victoria Island (38).

Uranium

Noranda Exploration Company Ltd. diamond drilled 700 m to test EM conductors in the Shane Lake area (52), southeast of Baker Lake. Some of the holes intersected extensions of uranium concentrations detected in the 1982 diamond drilling.

PNC Exploration (Canada) Company Ltd. explored claims in the Marjorie Lake area (48) by mapping, and by ground and helicopter-borne geophysical surveys. In the Eyeberry Lake (46) and Dunkel Lake (47) areas, PNC did ground follow-up of an airborne INPUT EM survey by reconnaissance mapping, boulder prospecting, lake sediment sampling and gradiometer and EM-16 surveys. The company also drilled 11 000 m in the Thekulthili Lake (44), MacInnes Lake, Salkeld

Lake and Hjalmar Lake areas (43), all in the Nonacho Basin.

Uranerz Exploration and Mining Ltd. conducted geological and radiometric surveys on its VIP claim near Powder Lake (45).

Urangesellschaft Canada Ltd. explored its claims west of Baker Lake on the Lone Gull property (50) and other claim groups in the area. Geophysical and geochemical surveys were conducted at Long Lake (51) and to the east and west of the main Lone Gull grid. Anomalies were drilled to the west and south-west of the main Lone Grill grid. Some 5 km from the Lone Gull uranium deposit, the company drilled 1 391 m in 8 holes, 6 of which intersected mineralization. The highest grade section assayed 0.75 per cent U_3O_8 across a bore-hole width of 5.8 m. A second mineralized zone was drilled 4 km from the Lone Gull uranium deposit. Six holes totalling 1 067 m intersected intermittent uranium mineralization in a 12 m-wide zone.

Westmin Resources Ltd. conducted ground surveys on its claims east and west of Itza Lake (49).

Other Commodities

Amax of Canada did extensive underground bulk sampling of its Mactung tungsten deposit (53).

Highwood Resources Ltd. continued exploration and development work on its Thor Lake beryllium-rare earth deposit in the Blatchford Lake Complex (54). Drilling, bulk sampling, beryllometer surveys and mineralogical studies have been undertaken. During the summer of 1984 approximately 800 m of diamond drill core was sampled along a north-south section of the T zone. Drilling to the end of 1984 outlined 434 500 t grading 1.4 per cent BeO (beryllium oxide) on the North T Zone and 1.2 million t grading 0.66 per cent BeO in the South T Zone. Also, 13 out of 89 previously drilled holes gave assays ranging from 2 to 2.5 kg of yttrium per t. As pre-feasibility studies of the beryllium deposits continue, potential co-product yttrium and rare earth element mineralization is being investigated. In January 1985, *Highwood Resources* resumed drilling on the Thor Lake property.

Yukon Territory

Mineral Production

Mineral shipments¹ in the Yukon Territory during the calendar year 1984 were valued at \$61.9 million compared with \$62.9 million in 1983. Precious metal production dominated mineral production with gold and silver production value accounting for \$44.2 million (71.4 per cent) and \$15.3 million (24.8 per cent) respectively. The leading sector of the Yukon mining economy was the Yukon placer gold mining industry which accounted for all gold production. Placer mining production declined marginally in 1984 to 2 946 kg (94 717 troy ounces) of gold declared for royalty payments from 3 008 kg (96 711 troy ounces) of gold declared in 1983. *United Keno Hill Mines* at Elsa and four small high-grade silver-lead-zinc operations accounted for the silver production. No other hard rock mines were in operation.

The outlook for the Yukon mining industry remained bleak in the absence of mineral production from a major hard rock mine, such as *Cyprus Anvil Mining Corporation's* Faro Mine, which ceased production on June 9, 1982 because of low zinc and lead prices and high operating costs. *Cyprus Anvil* operated a waste rock stripping program over its Faro zinc-lead-silver ore deposit from May 24, 1983 to October 28, 1984, under an agreement for joint funding of the project among the company, the federal government and territorial government. During October, 1984, the overburden stripping program was suspended because of a lockout of the labour unions, following a labour dispute. Transportation, power and labour were still viewed by the company as issues to be resolved before a decision to re-open the mine can be made. The Government of Canada through the Department of Indian and Northern Affairs assisted *Cyprus Anvil* during the year in its attempts to resolve their issues so that the mine can reopen. Dome Petroleum Limited, which holds 87.5 per cent of *Cyprus Anvil Mining Corporation* indicated that it intends to sell its interest in *Cyprus Anvil*.

The Yukon Territory accounted for 3.6 per cent of the gold, and 3.8 per cent of the silver, and 0.4 per cent of the lead produced in Canada in 1984. The Yukon Territories' mineral production value represented 0.7 per cent of Canada's metallic mineral

production value in 1984 compared with 0.8 per cent in 1983 and 2.45 per cent in 1982.

The Yukon lode mining industry employed 481 persons on a year-round basis including 41 at developing mines (20 at Mount Skukum and 21 at Venus). The Yukon placer gold mining industry employed an estimated 700 persons on a seasonal basis at 186 placer mining operations.

Table 3
Mineral Production of Operating Mines,
Yukon Territory, 1983 and 1984

Company, Mine and Commodity	1984		1983	
	t	kg	t	kg
<i>Archer, Cathro and Associates Ltd., Sadie Ladue Mine</i>				
silver		1 554.8		3 077
lead	72.6		136.5	
<i>Kane Mine</i>				
silver		36.5		—
lead	0.84		—	
zinc	0.16			
<i>Cyprus Anvil Mining Corp., Faro Mine</i>				
lead	—		—	
zinc	—		—	
silver		—		—
<i>Dawson Eldorado Gold Mines Ltd., Plata Mine</i>				
silver		9 330		2 891
lead	1 360.8		428.6	
<i>Springmount Mining Co. Ltd., Keno Hill Mines</i>				
silver		5 845		3 469
lead	180		114.6	
<i>United Keno Hill Mines Ltd.</i>				
lead	879.5		484	
zinc	98.0		63	
silver		32 109		19 911

Source: Department of Indian Affairs and Northern Development. These production figures are those reported by the mines as production and may not match Statistics Canada production figures which are based on metals sold or shipped.

¹ reported by Statistics Canada as "mineral production"



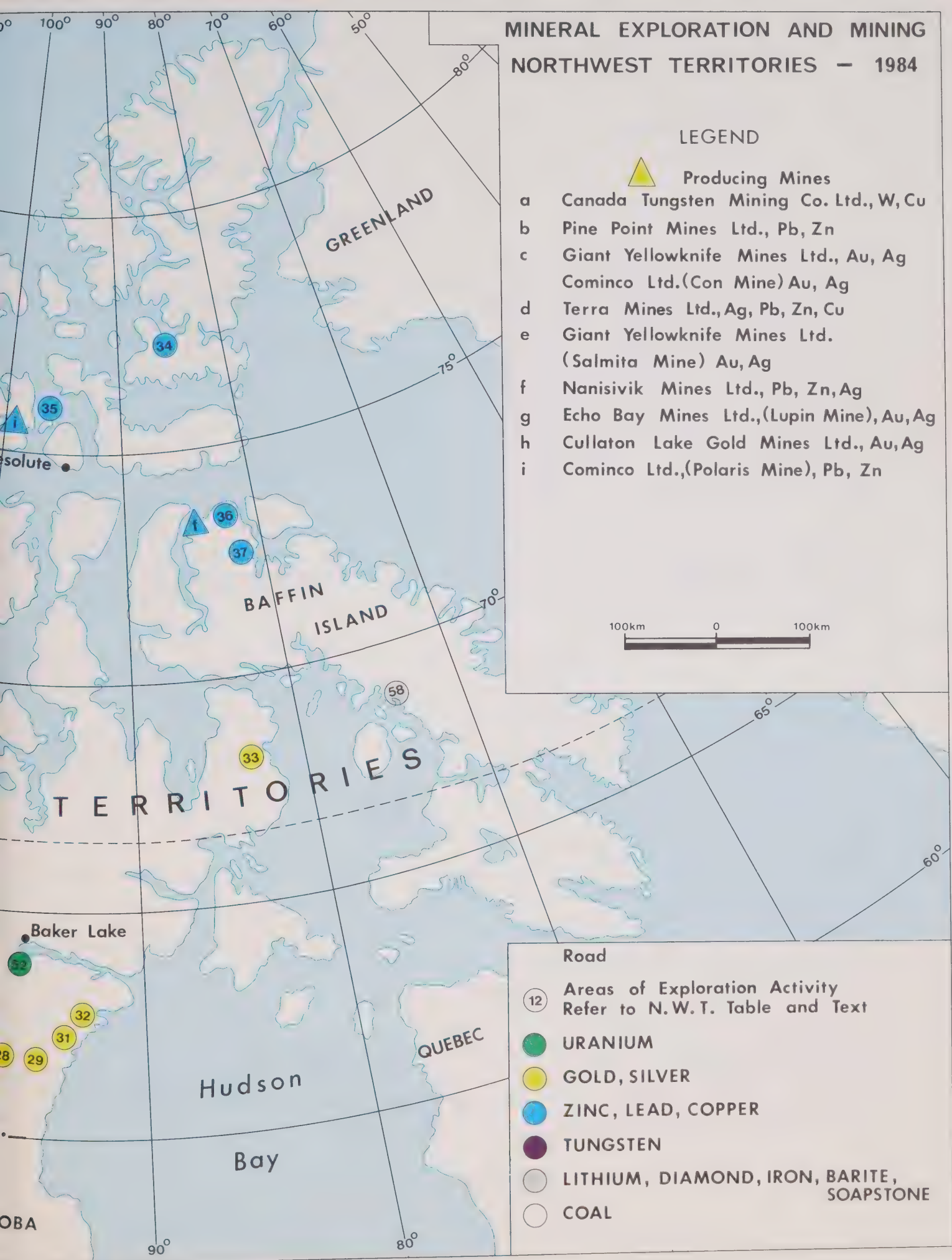
MINERAL EXPLORATION AND MINING NORTHWEST TERRITORIES - 1984

LEGEND



Producing Mines

- a Canada Tungsten Mining Co. Ltd., W, Cu
- b Pine Point Mines Ltd., Pb, Zn
- c Giant Yellowknife Mines Ltd., Au, Ag
Cominco Ltd.(Con Mine) Au, Ag
- d Terra Mines Ltd., Ag, Pb, Zn, Cu
- e Giant Yellowknife Mines Ltd.
(Salmita Mine) Au, Ag
- f Nanisivik Mines Ltd., Pb, Zn, Ag
- g Echo Bay Mines Ltd.,(Lupin Mine), Au, Ag
- h Cullaton Lake Gold Mines Ltd., Au, Ag
- i Cominco Ltd.,(Polaris Mine), Pb, Zn



Road

- 12 Areas of Exploration Activity
Refer to N.W.T. Table and Text

- URANIUM
- GOLD, SILVER
- ZINC, LEAD, COPPER
- TUNGSTEN
- LITHIUM, DIAMOND, IRON, BARITE,
SOAPSTONE
- COAL

YUKON MINERAL EXPLORATION AND MINING — 1984

LEGEND



Producing Hardrock Mine

- a United Keno Hill Mines Ltd., Ag, Pb, Zn, Cd
Archer, Cathro & Associates Ltd., Ag, Pb
Springmount Operating Co. Ltd., Ag, Pb
- b Cyprus Anvil Mining Corp. Ltd., Pb, Zn, Ag
- c Dawson Eldorado Gold Expl. Ltd., Ag, Pb
- d Archer, Cathro & Associates Ltd., Ag
- (21) Areas of Mineral Exploration Activity
Refer to Yukon Table and Text



LEAD—ZINC—SILVER



TUNGSTEN, TIN, MOLYBDENUM

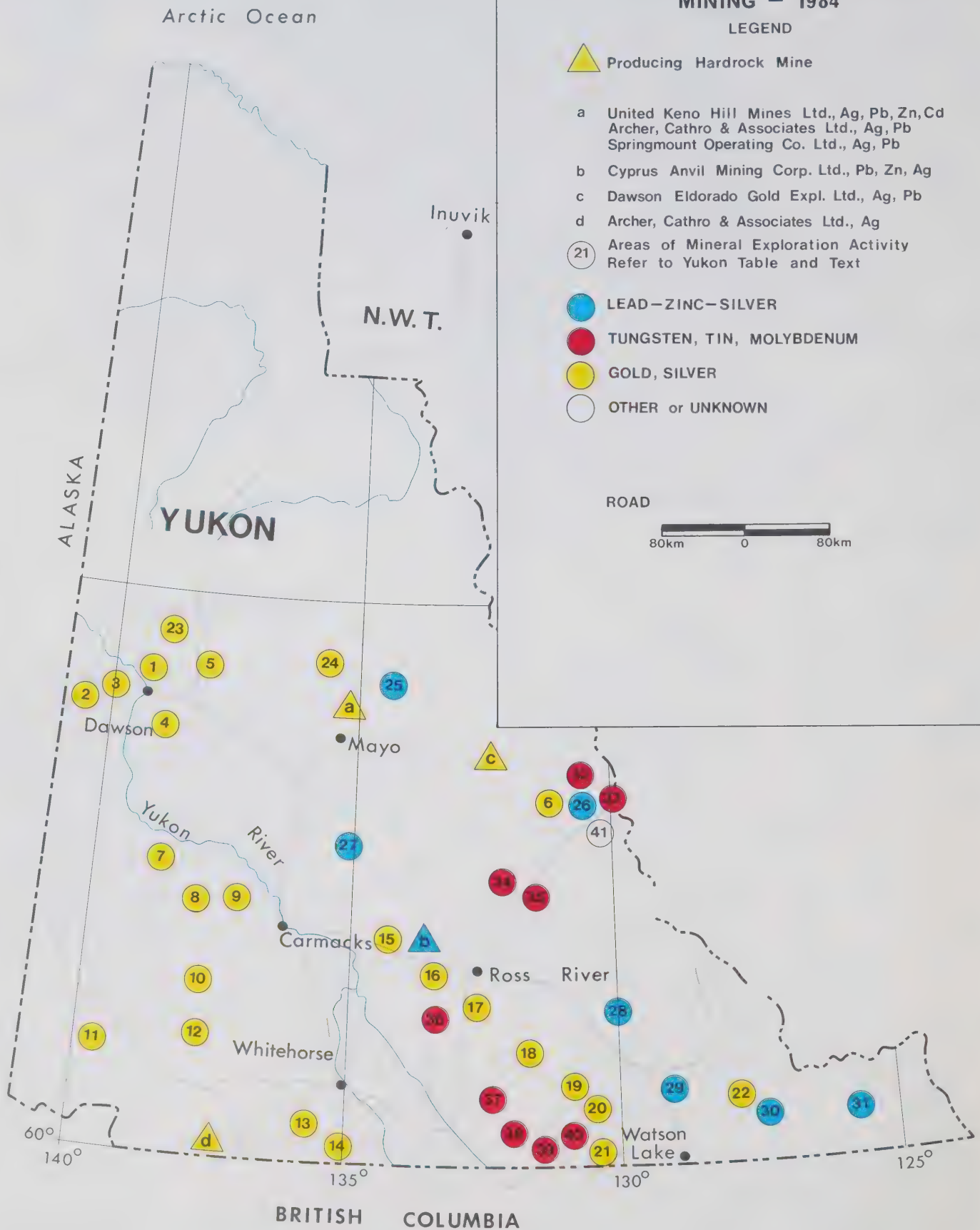
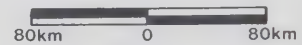


GOLD, SILVER



OTHER or UNKNOWN

ROAD



Mines

United Keno Hill Mines Limited

The company's mining operations in Elsa (a)* produced 55 607 t of ore, which was milled to produce 31 109 kg of silver, 879.5 t of lead and 98 t of zinc. Underground mine production was concentrated in the Husky and Ruby Mines. During the year the company successfully completed the opening phase of an unprecedented exploration program designed to define new ore reserves. The program included 24 993 m of percussion and downhole hammer drilling and 3 744 m of diamond drilling. Exploration adits were collared and drifts driven at the Bellekeno, Lucky Queen, Silver King and Mount Hinton properties, all in the Elsa Mine area, to explore strike extensions of silver veins. New reserves were outlined at the Ruby Mine and Silver King 4 and 5 mines.

Type:	Underground
Location:	Keno-Galena Hill, near Elsa
Product:	Silver-bearing lead and zinc concentrate
Mill Capacity:	450 t per day
Tonnes Milled:	55 607 (259 tpd)
Reserves:	213 016 t (Dec. 31, 1984)
Reserve Grade:	778 g silver per t, 3.1% lead, 0.3% zinc
Employees:	179

Seasonal Small Lode Silver Mining Operations

Archer, Cathro and Associates (1981) Ltd. mined the high-grade Sadie-Ladue vein (a) for the second consecutive year under an agreement with *United Keno Hill Mines Limited*. Approximately 136 080 t of overburden was moved and 181.4 t of ore, grading 8 571 g of silver per t with 40 per cent lead, was mined from the open pit workings.

Archer, Cathro and Associates (1981) Ltd., under a lease agreement, mined the Kane property (d), south of Dezadeash Lake. During September, approximately 18 t of hand sorted direct-shipping ore was mined.

Dawson Eldorado Gold Explorations Ltd. and *Silvercrest Resource Corporation* mined the Plata and Inca claims (c), in the Rougue and Hess River area, for the second consecutive year. Between May and October the joint venture company mined 227 t from the Inca No. 7 Zone and 1 361 t from the Plata No. 2 Zone to recover 9 330 kg of silver and 1 360.8 t of lead. Bulldozer trenching removed 114 680 cubic meters of earth. The ore was transported from mine site 176 km by air to Ross River from where it was shipped by truck to the *Cominco* smelter at Trail, B.C. A 225 m-long exploration and access adit was driven to reach the Plata No. 2 Zone, 106 m below the existing open pit, in late 1984 and early 1985.

Springmount Operating Company mined for the second consecutive year in the Keno Hill (a) area, with two operations, one at the old Silver Spring Mine and the second at the Mount Keno Mine. The company produced 318 t of high grade silver-lead-zinc ore.

Placer Mining

Placer Mining activity in 1984 was reduced from the 1983 level with mine operations being concentrated in the traditional placer mining areas, the Klondike, Sixty Mile, Mayo, Clear Creek and Kluane areas. There were approximately 186 placer mines in operation or being prepared for operation during 1984, the lowest number of operations in several years.

Two underground placer gold operations were in production at year's end 1984 at the Jackson Hill (1) and Miller Creek properties (2). *Jackson Hill Ventures-Universal Exploration* mined the Jackson Hill property in the Klondike area during the winter of 1984-1985. Nearby, *Miben Mining Company* mined its Dago Hill underground mine during the winter of 1983-1984. Similarly, *Chumar Placers* operated the Miller Creek Mine in the Sixtymile area during the winters of 1983-1984 and 1984-1985.

Gold production in 1984 reported for royalty payments amounted to 2 946 kg valued at \$44.2 million compared with 3 008 kg of gold in 1983 valued at \$50.5 million.

* numbers or letters in parenthesis indicate the location of the property on the Yukon map.

Staking activity related to placer mining was down during 1984. There were 1 843 new claims and 202 new leases for 1 024 km staked to December 31, 1984 compared with 2 605 new claims and 521 new leases for 1 067 km staked during 1983. There were 15 516 placer claims and leases and 8 dredging leases in good standing at year's end.

Development

Erickson Gold Mines Limited under a development agreement with *AGIP Canada Ltd.* conducted an accelerated development program on AGIP's Mount Skukum (13) gold property. At year's end, a 641 m-long adit had been driven to the Main Ore Zone or Cirque Zone, where drill indicated reserves amount to 150 000 t averaging 25 g of gold per t and 21.6 g of silver per t. *Erickson* plans to bulk sample the Main Ore Zone early in 1985 and commence production at a rate of 200 to 300 t per day late in 1985.

Cyprus Anvil Mining Corporation removed a total of 5 million cubic meters of overburden from the Faro No. 3 deposit (b) up to the end of October when operations were shut down by a company lockout. An agreement between the company and the federal government directed funds toward the second year of a two-year stripping program. The waste rock overlying the Faro No. 3 deposit was removed with 50 per cent government funding up to \$25 million, repayable upon resumption of mine production. The proven mineral resources amount to 27.97 million t grading 4.6 per cent zinc, 3.1 per cent lead, 38.3 g silver per t and 0.16 per cent copper.

Amax Northwest Mining Company Ltd. mined a 200 t bulk sample at its Mactung tungsten deposit in the Macmillan Pass area (33). *Amax of Canada Limited* has conducted extensive feasibility studies in preparation for future production from the Mactung deposit.

United Keno Hill Mines Ltd. spent in excess of \$1.6 million during 1984 to conduct a program of surface drilling and underground drifting on its Venus gold-silver property (14). New high-grade gold-silver ore shoots outlined will make a significant addition to the previous mineral inventory of 108 710 t grading 7.55 g per t gold, 226 g per t silver, 1.89 per cent lead and 1.37 per cent zinc.

In the Elsa mine area (a), *United Keno Hill Mines Ltd.* conducted an extensive exploration-development program for silver-lead-zinc veins. New adits were driven at Silver King, Lucky Queen, Bellekeno and Mt. Hinton 19 veins. The company was particularly successful at the Ruby Mine where a crosscut into a faulted offset intersected new high grade silver reserves. Also reserves at the Husky Mine and Silver King No. 4 and No. 5 veins were increased.

Mineral Exploration

Mineral exploration expenditures in the Yukon were estimated at \$21 to \$23 million during 1984 compared with \$12 million during 1983. Most of the exploration activity was for precious metals.

The total quartz claims (hardrock claims) in good standing at year's end 1984 was 47 475 up from 45 402 at year's end 1983. During 1984, 8 152 new quartz claims were staked. The most active staking areas in 1984 were in the Wheaton River area (13), the Ketza River area (17) and the Dawson area (1), where exploration was for precious metals.

Table 4
Quartz Claims Recorded in Yukon, 1983 and 1984

District	1984	1983
	Claims Recorded	Claims Recorded
Dawson	2 823	977
Mayo	298	540
Watson Lake	1 975	1 418
Whitehorse	3 056	1 675
TOTAL	8 152	4 610

Exploration Projects

Gold and Silver

Archer, Cathro and Associates (1981) Ltd. conducted geological mapping and a soil geochemical survey on the Pork property (22) northwest of Watson Lake. Low but widespread gold values are associated with siderite alteration and silification of the Hadrynian Grit Unit along fault zones. The company also excavated trenches and drilled three diamond drill holes totalling 312 m on the NUCLEUS claims (9), west of Carmacks. In the same area the company excavated two bulldozer trenches on the Cash property.

Under the name of the *Klondike Project*, *Archer Cathro and Associates (1981) Ltd.* and *Dawson Eldorado Gold Explorations Co. Ltd.* performed geological and geochemical work on claims in the Dawson area. Work was conducted on the Lepine property (KLEP claims) (3) and on the Lone Star property (4).

AGIP Canada Ltd. worked on the Odd property (13) (MAX claims), which is jointly owned with *Shakwak Exploration Co.* They conducted geological mapping, a geochemical survey, diamond drilling and road construction.

Canamax Resources Inc. conducted geological mapping and geochemical sampling of talus fines on the NUKE claims (6).

Cody Hawk Resources and Conwest Exploration Co. Ltd. conducted geochemical and geophysical surveys on the O'Brien (A.J.) property (5). Quartz-tourmaline-sulphide veins with gold values occur within the hornfels aureole of the Antimony Mountain stock.

Cordilleran Engineering performed work for *Regional Resources Ltd.* and its partners on several properties in the Rancheria silver area, including the MID, TIM, PL claims and the SPENCER claims (21), the MEISTER claims (20) and the LOGAN claims (19). On the MID claims, work included geological mapping, soil sampling, trenching and diamond drilling. On the TIM, PL and SPENCER claims, work included geological mapping and soil sampling. The MEISTER and LOGAN claims are jointly owned by *Getty Canadian Metals Ltd.* and *Regional Resources Ltd.* Work on the MEISTER claims (20) included geological mapping, an Induced Polarization (IP) survey, soil sampling, trenching, and drilling of 231 overburden drill holes totalling 298 m. Work on the LOGAN claims

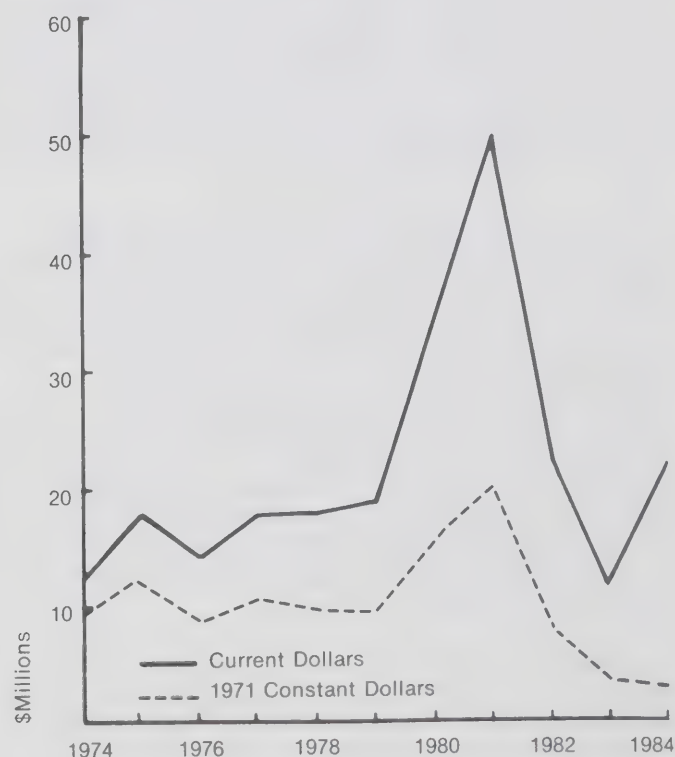
(19) included geological mapping, and Induced Polarization and magnetometer surveys.

Decker Resources Ltd. geologically mapped and collected soil samples on the Laurasia property of *Laurasia Resources (a)*. Three coincident silver-lead geochemical anomalies were outlined.

Gordon Dixon uncovered a silica-rich argentiferous vein swarm in Late Cretaceous rhyolite on the J. Bill claims (9), northwest of Mount Nansen.

Halferdahl and Associates Ltd. conducted an extensive work program including geological mapping, geochemistry, geophysics, trenching and diamond drilling on the GLEN property (11).

Figure 2
Mineral Exploration Expenditures
Yukon Territory



Hudson Bay Exploration and Development Co. Ltd. conducted geological mapping, geochemical and geophysical surveys, diamond drilling and trenching on the CANYON claims (16) at Grew Creek near Ross River. Disseminated gold mineralization is associated with silicification, bleached breccia zones and massive argillic alteration in Tertiary ash flow tuff and rhyolite. The volcanic rocks are restricted to a linear graben within the Tintina Trench.

Hudson Bay Exploration and Development Co. Ltd. conducted VLF EM and magnetometer surveys and drilled 12 NQ diamond drill holes totalling 886 m on the Hatch property (10) in the Nisling Range. The property includes the HATCH, PATCH, THATCH, CATCH and LEN claims. *Hudson Bay* also conducted geological mapping along with heavy mineral concentrate and litho-geochemistry on a lead-silver geochemical target on the BEYON claims (15).

Kerr Addison Mines Ltd. performed geological mapping and geochemical sampling on the HIK, AL and KOE claims (10) west of Carmacks. *Kerr Addison* also conducted a reconnaissance program in western Yukon, principally for gold (12).

Ketza River Mines Ltd.'s Ketza River property (17), under option to *Canamax Resources Inc.* and *Pacific Trans-Ocean Resources Ltd.*, received extensive exploration work to increase gold resources indicated by previous drilling. The program included geological mapping, soil geochemistry, airborne electro-magnetic and magnetometer surveys, trenching, and diamond drilling of 59 NQ holes totalling 7 954 m. Drilling intersected mineralization in 42 of 59 holes. Reserves were increased to 459 590 t grading 9.63 g gold per t. Over half of the tonnage is accessible by open pit mining. Most mineralized zones consist of flat-lying sulphide pods in limestone. Others are steeply dipping veins.

Mount Skukum Gold Mines (AGIP Canada Ltd. and Erickson Gold Mines Ltd.) conducted geological mapping, soil and rock chip geochemistry, trenching and diamond drilling on their Mount Skukum property (13). Ten trenches were excavated and 61 NQ diamond drill holes were drilled totalling 6 097 m. *Erickson* drove a 640 m-long adit to the Main Zone (Cirque Zone) ore deposit, a steeply dipping high-grade auriferous quartz-carbonate vein system, hosted in

flat lava flows. *Erickson* previously estimated reserves at the Main Zone at 150 000 t grading 25 g per t gold and 21.6 g per t silver. Under an agreement, *Erickson Gold Mines* has the right to earn a 45 per cent interest in the Mount Skukum property.

Shakwak Exploration Co. conducted geochemical and Induced Polarization surveys on its Revenue Creek property (9), west of Carmacks. Nine diamond drill holes totalling 625 m were completed.

Tintina Mines Ltd. performed work on its Eagle claims (18) consisting of trenching, geological mapping and relogging of drill core.

United Keno Hill Mines Ltd. conducted an extensive exploration and development program in the Elsa Mine site area (a) to increase ore reserves. The program included drilling of 352 percussion holes totalling 18 288 m, 16 downhole hammer drill holes totalling 6 706 m and 34 NQ diamond drill holes totalling 3 745 m. Geophysical surveys included ground EM surveys on the SILVER KING, HUSKY SW, ANTHONY and BEAR claims and an airborne EM survey on the 'Central Quartzite' unit of the company's claims. New adits were driven on Mt. Hinton 19, the Silver King, Lucky Queen and Bellekeno veins to explore strike extensions of the veins.

In the Dawson area (4), *United Keno Hill Mines Ltd.* drilled 7 620 m of rotary percussion holes on various claims in search for gold. The company was the main author of a staking rush in the area which saw quartz claims covering most of the known placer gold-bearing creeks including Bonanza, Eldorado, Hunker, Dominion and Sulphur Creeks.

United Keno Hill Mines Ltd. conducted a vigorous drilling and underground exploration program on its Venus Mine property (14). A program consisting of 1 430 m of surface diamond drilling, 2 819 m of downhole hammer drilling in 44 holes was completed to test vein systems 450 m to 1 370 m northwest of the Venus vein. The 1984 underground drifting and raising program was conducted to examine parts of the Venus Vein. The program located a number of high-grade gold-silver-lead-zinc ore shoots, which will make a significant addition to the previously outlined tonnage.

Zinc-Lead (Silver)

Archer, Cathro and Associates (1981) Ltd. did some hand trenching on the Marg property (TUDL claims) (25) for the ZX Joint Venture. *Archer Cathro* also performed geological mapping, chip sampling for geochemistry and hand trenching on their Mt. Williams property (24), including the BLENDE claims. Trench samples averaged 3.6 per cent lead, 0.3 per cent zinc and 69 g per t silver across a true thickness of 13 m.

Canamax Resources Inc. mapped the Hundere property (29), including the CIMA, MICA and HUN claims and a soil geochemistry survey was conducted.

Cominco Ltd. drilled seven NQ diamond drill holes on the FIN claims (28) for a total of 1 655 m. Cominco also drilled three HQ diamond drill holes totalling 1 186 m on the NIDD property (26). Some 968 soil samples were collected for geochemical analysis for lead, zinc and silver.

Cyprus Anvil Mining Corporation drilled 22 NQ diamond drill holes totalling 4 267 m on its claims in the Faro area (b). Geological mapping was carried out over a number of claims.

Dawson Eldorado Gold Exploration Co. Ltd. channel sampled a lead-zinc-silver-bearing vein on the KIWI property (23).

Getty Canadian Metals Ltd. conducted a gravity survey and a horizontal loop EM survey on its Clear Lake property (27), including the SUE, GETA and GETD claims. One NQ diamond drill hole of 457 m was drilled but no significant mineralization was intersected. The Clear Lake property contains a stratabound, massive sulphide, lead-zinc-silver deposit.

Sulpetro Minerals Ltd. did some geological mapping and geochemical sampling on its MEL zinc-lead-barite property (30).

Utah Mines Ltd. worked on the BEAV claims (31) which are located around a soil geochemical anomaly and EM conductors. The company remapped the claims, collected soil samples and drilled four NQ diamond drill holes totalling 954 m. No significant lead-zinc mineralization was found.

Tin, Tungsten, Molybdenum

Canamax Resources Inc. mapped and collected 1 118 soil samples on the HEAD, HOT and HAT claims in the Rancheria area (40). The HOT claims cover narrow veins and fractures in a calc-silicate hornfels containing tungsten and molybdenum. *Canamax Resources* also worked on the NARL claims (35), Dragon property (NURF claims) (34) and Keele Peak property (32), all northeast of Ross River. A 125 line-km survey of the NARL claims by magnetometer and EM was conducted. The NURF claims were mapped and soil sampled for zinc, tungsten and gold. A geophysical survey was carried out on the Keele Peak property.

Barite

Yukon Barite Company Ltd. hand blasted a 35 m long trench on a barite deposit on the MOOSE claims (41).

Table 5
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	A. Black	MONA	Ag, Au, Pb, Zn
2	J. Schumanek et al.	Clarke Lake	Placer Au
2	E. and K. Barnes	Borden and Bennett Creeks	Placer Au
3	K. Herbert	Liard River	Placer Au
4	E. Linberg	Liard River	Placer Au
4	Hudson Bay	Liard River	Placer Au
5	D. and J. Turner	Liard River	Placer Au
6	Valhalla	FU (Norris Lake)	Au
7	Echo Bay/Comaplex	KIM (Indin Lake)	Au
7	Echo Bay	Lex Lake	Au
7	Frontier	VIDIE, CATHY (Indin Lake)	Au
8	Hot Resources	HOT (Slemon Lake)	Au
8	Cominco	BUGOW	Au
9	Blackridge/Cruiser	MQ 001	Au
9	Burnt Island	Gordon Lake	Au
9	C. Foisy	JUDY	Au
9	W. Knutsen/Ryan Energy	WT	Au
9	Giant Bay	MAHE (Gordon Lake)	Au
10	Ardic	Thompson-Lundmark	Au
10	Noranda	Weaver Lake	Au
11	Terra	TA (Bullmoose Lake)	Au
11	Genesis	BRANDY	Au
12	Silver Hart	BEAR (Sunset Lake)	Au
13	Cominco/Giant		
	Yellowknife/Roxwell	BS	Au
13	Cominco	NOD (Nodinka Narrows)	Au
13	Giant Yellowknife	SALERNO, RED	Au
13	Noranda	FAT	Au
14	Echo Bay	P, 81K (Point Lake)	Au
15	Echo Bay	RAFT, SHARE	Au
15	O.P. Resources	OP	Au
16	Echo Bay	NERAK	Ag
17	Echo Bay	Arcadia	Au
17	Echo Bay	GRUMPY	Au
18	Silver Hart	FARN, KNUT et al	Au
19	Echo Bay	Bathurst Inlet	Au
19	Silver Hart	G, T	Au
20	Back River JV	Back River	Au
21	Bow Valley	AU, BARB, KAP, FIN	Au
22	Noranda	SIDD (Uist Lake)	Au
23	Back River JV	RL (Regan lake)	Au
23	Cominco	GAS (Back River)	Au
23	Silver Hart	MATE, ALB	Au
24	Kidd Creek	FOX (Fox Lake)	Au
25	Talston River	O'Connor Lake	Au
26	Anaconda	SNO, BIRD	Au
27	Suncor	Mountain Lake	Au

Table 5 (continued)
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
28	Royex/Cullaton Lake	Ameto Lake	Au
29	Canadian Nickel	Maguse Lake	Au
30	Aberford	Imikula Lake	Au
31	Canadian Nickel	Mistake Bay	Au
32	Canadian Nickel	Pork Peninsula	Au
33	Borealis	Roche Bay	Au
34	Petro-Canada	Baumann Fiord	Pb, Zn
35	Cominco	Kalivik Island	Pb, Zn
35	Tanqueray	Baille Hamilton Island	Pb
36	Petro-Canada	PEX (Elwin Inlet)	Pb, Zn
36	Nanisivik		Pb, Zn
37	Nanisivik		Pb, Zn
38	B. Reed et al	Hadley Bay	Cu, Co
39	Panarctic Oil	Shaler Mountains	Cu, Ag
40	Panarctic Oil	Diamond Jenness Pen.	Cu, Ag
41	Enxco	Rutledge lake	Cu, Ni
42	C.E.G.B.	Dumas Lake	U
43	PNC	MacInnes Lake	U
43	PNC	Salkeld and Hjalmar lakes	U
44	PNC	Thekulthili Lake	U
45	Uranerz	VIP (Powder Lake)	U
46	PNC	Eyeberry Lake	U
47	PNC	Dunkel Lake	U
48	PNC	Marjorie Lake	U
49	Urangesellschaft	Ifo Lake	U
49	Westmin	Itza Lake	U
50	Urangesellschaft	PL27	U
50	Urangesellschaft	LONE GULL	U
51	Urangesellschaft	Long Lake	U
52	Noranda	Shane Lake	U
53	Canamax	MACTUNG	W
54	Highwood	THOR (Blatchford Lake)	Be, REE
55	United Kingdom	Sawmill and Coal mountains	Coal
56	P. and M. Jones	Spruce Lake	
57	DIAND	Bathurst Inlet	Soapstone
58	DIAND	Longstaff Bluff	Soapstone
59	O.P. Resources	El Bonanza	Au
a	Canada Tungsten	Cantung	W
b	Pine Point	Pine Point	Pb, Zn
c	Cominco	Keg Lake	Au
c	Halferdahl	PRO (Prosperous Lake)	Au
c	Goldak	Mirage Islands	Au
f	Nanisivik	Nanisivik	Pb, Zn
g	Echo Bay	PEN	Au
h	Royex	Cullaton Lake	Au
i	Cominco	POLARIS, ECLIPSE	Pb, Zn

Table 6
Exploration - Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	Jackson Hill	Jackson Hill	Placer Au
1	Miben	Dago Hill	Placer Au
2	Chumar Placers	Miller Creek	Placer Au
3	Dawson Eldorado	KLEP (Lepine)	Au
3	Dawson Eldorado	KTMR	Au
4	United Keno Hill	Dawson	Au
4	Dawson Eldorado	Lone Star	Au
5	Cody Hawk/Conwest	AJ, JA (O'Brien)	Au
6	Canamax	NUKE	Ag, Pb, Zn
7	Kerr Addison	KOE	Au
8	Archer, Cathro	FOX (Cash)	Au
8	Archer, Cathro	LILYPAD, NEWT (Frog)	Au
9	Archer, Cathro	NUCLEUS	Au
9	G. Dixon	J. BILL	Au
9	Shakwak	Revenue Creek	Au, Ag, Cu, W
10	Kerr Addison	HIK, AL	Au
10	Hudson Bay	HATCH, PATCH	Au
11	Halferdahl	GLEN	Au
12	Kerr Addison	ITTL	Au
13	Erikson/AGIP	KUKU, CHIEF, WOOF (Mt. Skukum)	Au
13	Shakwak/AGIP	MAX (Odd)	Au
14	United Keno Hill	VENUS	Au, Ag, Pb, Zn
15	Hudson Bay	BEYON	Ag, Pb
16	Hudson Bay	CANYON	Au
17	Canamax/Conwest	KON (Ketz River)	Au
18	Tintina	EAGLE	Ag, Pb, Zn, Au
19	Regional/Getty	LOGAN	Ag, Pb, Zn, Cu, Sn
20	Regional/Gerry	MEISTER	Ag, Zn
21	Regional/Canamax/Procan	MID, TIM	Ag, Pb, Ba
21	Regional	PL, SPENCER	Pb, Zn
22	Archer, Cathro	PIGLET (Pork)	Au
23	Dawson Eldorado	KIWI	Ag, Pb, Zn
24	Archer, Cathro	BLLENDE (Mt. Williams)	Ag, Pb, Zn
25	Archer, Cathro	TUDL (Marg)	Cu, Pb, Zn
26	Cominco	NIDD	Pb, Zn, Ag
27	Getty	SUE, GETA (Clear Lake)	Pb, Zn, Ag
28	Cominco	FIN	Pb, Zn
29	Canamax	CIMA, MICA, HUN (Hundere)	Pb, Zn, Cu, Ag
30	Sulpetro	MEL	Zn, Pb, Ba
31	Utah	BEAV	Pb, Zn
32	Canamax	NUT (Keele Peak)	W, Cu, Pb, Zn, Au, Ag
33	Canamax	MACTUNG	W
34	Canamax	NURF (Dragon)	W, Zn, Au
35	Canamax	NARL	W

Table 6 (continued)
Exploration - Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
36	Cub JV	HIDDEN	W
37	DC Syndicate	DB	Sb, W
38	CSA Minerals/Duval	MC, SWIFT, SLIDE, JILL	Sb, Zn
39	CSA Minerals/Duval	VAL A, VAL B	Sb
40	Canamax	HEAD, HAT, HOT	W, Mo, Pb, Zn, Ag
41	Yukon Barite/Nuspar	MOOSE	Ba
a	Decker	AMBER (Laurasia)	Ag, Pb
a	United Keno Hill	BEAR, ANTHONY, CORAL-WIGWAM	Ag, Pb, Zn
b	Cyprus Anvil	Faro	Zn, Pb, Ag

Footnotes for Tables 5 and 6

(1) Table location is made with reference to corresponding numbers on Yukon and Northwest Territories maps. Locations are approximate.

(2) Abbreviated name of the Company is used: Expl. (Exploration), Ltd. (Limited), JV (Joint Venture).

(3) Geographical areas are indicated by small print, whereas claims and groups are capitalized. Abbreviated words are: Peninsula (Pen), River (R), Lake (L).

(4) Metal(s) of primary importance defined by chemical symbols: copper (Cu), gold (Au), lead (Pb), tantalum (Ta), lithium (Li), asbestos (Asb), molybdenum (Mo), silver (Ag), barium (Ba), cobalt (Co), tin (Sn), iron (Fe), tungsten (W), niobium (Nb), beryllium (Be), rare earth elements (REE), mercury (Hg), antimony (Sb) and uranium (U).

Appendix 1

Organizational Structure and Mandate

As of June 1985, the Minister and departmental officers responsible for the administration of mines and mineral resources in the Northwest Territories and the Yukon were:

Minister:	David E. Crombie
Deputy Minister:	B. Rawson
Assistant Deputy Minister (Northern Affairs):	G.N. Faulkner
Director General, Northern Resources and Economic Planning:	R.D. Glass
Director, Mining Management and Infrastructure:	Dr. J. Lazarovich
Chief, Mining Administration:	J.M. Hodgkinson
Head, Mining Resources Section: Evaluation Geologist: Technical Information Officer:	Dr. D.D. Brown T.W. Caine P.T. Marion
Head, Mining Lands Section: Head, Legislation: Head, Royalties:	T.W. Dent P.M. Corrigan vacant
Chief, Mineral Policy:	J. Fraser
Chief, Infrastructure:	W.G. Cleghorn
Address:	
Department of Indian Affairs and Northern Development Les Terrasses de la Chaudière OTTAWA, Ontario K1A 0H4	
Phone (Mining) (819) 997-0911	

Northern Affairs Program

Yukon Region

Director General	M.J. Morison
Director, Mineral Resources:	C. Ogilvie
Chief Geologist: District Geologist: Placer Geologist: Staff Geologists:	Dr. J.A. Morin J.G. Abbott S. Morrison D. Emond D. Downing
Map Sales and Core Librarian	R. McIntyre
Regional Manager, Mineral Rights: Mining Recorders:	B.R. Baxter M.A. Fish, Whitehorse D.F. Jennings, Dawson R.G. Ronaghan, Mayo P. McLeod, Watson Lake
Regional Mining Engineer: District Mining Engineer: Mine Rescue Superintendent: Environmental Technician:	C.H. Macdonald N. Prasad N. Mainer D. Cormier
Chief Claim Inspector: Mining Claim Inspectors:	G. Gilbert L. Olynyk R. Whittingham
Address:	
Department of Indian Affairs and Northern Development 200 Range Road WHITEHORSE, Yukon Y1A 3V1	
Phone (switchboard) (403) 668-5151	

Northern Affairs Program

Northwest Territories Region

Director General:	P.H. Beaubier
Director, Minerals and Economic Analysis:	G. Patenaude
Chief Geologist:	Dr. W.A. Padgham
District Geologists:	Dr. W.A. Gibbins P.J. Laporte C.C. Lord J.M. Seaton J.A. Brophy C. Ellis V.A. Jackson
Staff Geologist:	
Archive Geologist:	
Project Geologist:	
Regional Manager, Mining Lands:	E.D. Cook
Mining Recorders:	T. Miedema E.J. McLeod

Address:

Department of Indian Affairs
and Northern Development
P.O. Box 1500
YELLOWKNIFE, Northwest Territories
X1A 2R3

Phone (switchboard) (403) 920-8110

Department of Indian Affairs and Northern Development

The Department of Indian Affairs and Northern Development (DIAND) is responsible for the administration of all mines and mineral activities in the Yukon and Northwest Territories. DIAND, as part of the federal government, administers the policy and legislative instruments which govern the mining industry in both territories.

Within DIAND's Northern Affairs Program, major functional groups, which deal directly with the mining industry, are the Northern Resources and Economic Planning Branch and the Northern Environment Branch at Headquarters, and the Regional Northern Affairs Program Branches in the Yukon Region and Northwest Territories Region.

The Northern Resources and Economic Planning Branch at Headquarters consist of three directorates: Northern Economic Planning, Oil and Gas Management and Major Projects, and Mining Management and Infrastructure. This branch is accountable for the development of departmental strategies, policies, legislation, plans and programs related to northern economic development, including the development and management of non-renewable resources and northern economic infrastructure. In addition, the Branch has a headquarter's function in the co-ordination of federal and territorial activities in the area of northern economic resource development and departmental policies and mechanisms to provide socio-economic development and benefits.

In 1982, the Northern Resources and Economic Planning Branch underwent a re-organization which resulted in the establishment of the Mining Management and Infrastructure Directorate, integrating the Transportation and Communications Division, Northern Roads and Airstrips Division, Non-Renewable Resources Development Division and the Mining Division. The Mining Management and Infrastructure Directorate brings the mining and infrastructure elements of the Northern Program together to give co-ordination on issues related to mineral policy, mineral resources, mining industry development, mining legislation and infrastructure support.

The Mining Management and Infrastructure Directorate develops and administers federal northern mineral policy and legislation, assesses infrastructure requirements of existing and potential resource operations requiring roads, airstrips and other transportation modes, and administers mining and mineral rights. The Directorate consists of the Mining Administration Division, the Mineral Policy Division and the Infrastructure Division.

Mining Administration Division

The Mining Administration Division develops policy related to the regulation of the Northern mineral industry, which includes providing for the consultative process with industry and initiating and drafting of appropriate acts, regulations and policy documents related to the disposition and to the administration of mineral rights in the Yukon Territory and Northwest Territories. The Division administers the royalty provisions of the *Yukon Quartz Mining Act*, *Canada Mining Regulations* and *Territorial Coal Regulations*. The Division advises and negotiates with various government agencies whose responsibilities interface with mining in the Territories, provides information on current and proposed exploration and mining developments and maintains a microfiche library of assessment reports, geological reports and other mineral resource information.

Mineral Policy Division

The Mineral Policy Division develops policies and plans to promote the orderly management and development of mineral resources in the Yukon and Northwest Territories. In support of these activities, it conducts studies and investigations of the economic aspects of mineral industry operations. Similar studies and investigations are also carried out to assess proposed major new mine developments in the Territories and to monitor existing operations. A major activity of the Division, together with Mining Administration Division and Infrastructure Division, at present, is the development of a northern mineral policy to guide mineral development in the Territories over the next decade. Although only the preliminary phases of policy development have been completed, the Minister has stated that he would like to address such issues as the role of mining in the northern economy, the involvement of native people, the provision of infrastructure, the creation of a favourable investment climate through the main-

tenance of an appropriate fiscal and regulatory regime and the establishment of an appropriate balance between people, minerals and the environment.

Infrastructure Division

The Infrastructure Division is responsible for policy, assessing, planning, programming and funding of infrastructure requirements in the North including roads, airstrips and other transportation modes within the general framework of northern development strategies, policies, plans and programs for northern economic development. The Division provides overall management for the Northern Roads Program. In addition, it manages the Northern Resource Roads Program under which the Department enters cost sharing agreements with industry for the construction of initial and permanent access roads.

Regional Offices – Yukon and Northwest Territories

The Yukon Region Branch and Northwest Territories Region Branch of the Northern Affairs Program are major functional groups, which under the direction of regional Directors General, administer the mandate of the Program and the provisions of mining legislation and regulations within the respective Territories. Offices are located at Whitehorse, Y.T. and Yellowknife, N.W.T.

The Regional Branches have the following subunits: Mining Lands Section, Geological Services Sections and a Mining Inspection Section (in the Yukon only).

Mining Lands Sections

The Mining Lands Section in the Yukon and Northwest Territories administrative offices have been divided into seven mining districts. A mining recording staff is responsible for the disposition of mineral rights within each district in accordance with applicable legislation. There is a Supervising Mining Recorder in each territory, whose principal function is to ensure that the regulatory requirements are followed in the administration of the various mining acts and regulations.

Geological Services Sections

Geological Services Sections publish geological reports and maps and provide geological services to the mineral industry in both Territories. Offices are maintained at Whitehorse and Yellowknife. Two core libraries, the H.S. Bostock Library in Whitehorse and the C.S. Lord Library in Yellowknife preserve diamond drill core.

Each core library has laboratory facilities for core splitting, diamond-saw cutting, thin section preparation and core storage. Regional and district geologists conduct mineral property examinations, collect rock and mineral specimens and advise the mineral industry, government departments and research scientists on geological and exploration matters. Department geologists assist prospectors in identifying rock and mineral specimens, by conducting prospector training courses and preparing geological compilation maps on mineralized areas.

Mining Inspection Section

In the Yukon, the Mining Inspection Section gives advice on the *Mining Safety Ordinance* and *Mine Safety Regulations* of the Yukon Territory as well as the *Blasting Ordinance and Regulations of the Yukon Territory*.

It also prepares new safety legislation when required. A regional mining engineer is stationed at Whitehorse. This senior mining engineer has a staff consisting of a district engineer, an electrical-mechanical engineer, an environmental engineer, a mine rescue superintendent, three claim inspectors and a clerk.

The Section is responsible for the following: inspection of mines, quarries and blasting operations to ensure compliance with safety legislation; inspection of mineral claims to ensure compliance with the *Yukon Quartz Mining Act* and the *Yukon Placer Mining Act*; ensuring that sufficient mine personnel are trained in mine rescue, recovery operations and first aid; conducting ventilation and dust surveys; monitoring radioactive contamination, and carrying out environmental studies at underground and surface mining properties.

Table 7, Mineral Production - 1975-1984
Tableau 7, Production des Minéraux - 1975-1984

Yukon Territory - Yukon										
Mineral Minéraux	1975	1976	1977	1978	1979	1980	1981	1982	1983(R)	1984(P)
Gold - Or g - gr	\$ 5 255 077 997 986	4 401 075 1 111 949	4 656 118 921 907	8 518 731 1 202 149	13 749 271 1 190 268	63 029 000 2 982 000	66 382 000 3 746 000	39 721 000 2 656 000	50 337 000 3 006 000	44 200 000 2 946 000
Silver - Argent g - gr	\$ 28 531 397 196 943 109	12 809 321 92 697 630	20 154 760 127 415 268	28 462 559 143 459 000	54 218 064 129 982 000	114 120 000 147 000 000	32 339 000 80 000 000	29 943 000 95 000 000	6 891 000 15 000 000	15 346 000 44 000 000
Lead - Plomb kg - kg	\$ 54 888 680 122 863 633	15 990 040 32 035 681	47 627 667 68 621 899	64 322 403 79 233 298	103 374 279 78 250 062	71 558 000 65 771 000	54 935 000 55 970 000	25 733 000 35 493 000	307 000 520 000	838 000 1 139 000
Copper - Cuivre kg - kg	\$ 11 928 559 8 487 245	16 045 963 10 642 540	8 953 814 5 843 210	16 474 354 10 018 826	18 442 058 7 778 231	27 082 000 10 433 000	20 123 000 9 094 000	14 654 000 7 510 000	3 977 000 1 904 000	
Zinc - Zinc kg - kg	\$ 95 400 540 115 394 553	39 233 926 47 300 153	80 562 287 102 846 637	74 076 827 96 673 141	109 460 866 113 572 783	88 313 000 90 938 000	94 237 000 78 806 000	58 519 000 54 537 000	31 000 27 000	
Cadmium - Cadmium kg - kg	\$ 15 423 2 050	13 220 2 284	11 595 1 670	355 58					6 000 2 000	
Asbestos - Amiante tonnes - tonnes	\$ 32 820 720 103 735	35 310 723 103 431	47 493 872 95 590	26 948 800 53 255						
Sand and Gravel - Sable et gravier	\$ t							550 000 463 000	1 438 000 480 000	1 550 000 500 000
Coal - Charbon tonnes - tonnes	23 326	9 046	18 779	16 578	23 003	16 529	20 860			
Total	\$228 840 396	123 813 268	209 460 113	218 804 029	299 244 538	364 102 000	268 016 000	169 120 000	62 987 000	61 934 000

Source: Mineral Policy Sector, Energy, Mines and Resources and Northern Resources and Economic Planning, Indian Affairs and Northern Development.

(P) Preliminary Figures, (R) Revised Figures

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(P) chiffres provisoires (R) chiffres révisés.

Table 8, Mineral Production - 1975-1984
Tableau 8, Production des minéraux - 1975-1984

Northwest Territories - Territoires du Nord-Ouest

Mineral Minéraux	1975	1976	1977	1978	1979	1980	1981	1982	1983(R)	1984(P)
Gold - Or g - gr	\$ 28 754 047 5 460 651	24 390 081 6 162 252	31 336 428 6 204 583	45 769 718 6 458 948	61 868 488 5 355 926	96 920 000 4 209 000	85 495 000 4 825 000	91 415 000 6 113 000	144 570 000 8 634 000	187 229 000 12 400 000
Silver - Argent g - gr	\$ 8 883 385 61 319 168	14 342 774 103 794 822	18 716 934 118 325 557	23 854 173 120 237 000	34 770 651 83 358 000	41 331 000 53 000 000	13 465 000 33 000 000	16 073 000 51 000 000	33 743 000 74 000 000	17 634 000 50 200 000
Copper - Cuivre kg - kg	\$ 526 889 374 885	639 980 424 469	445 850 291 959	518 993 315 624	941 732 397 191	679 000 262 000	613 000 277 000	419 000 215 000	214 000 102 000	149 000 79 000
Lead - Plomb kg - kg	\$ 37 254 292 83 390 558	26 440 157 52 942 453	40 833 313 58 832 599	56 898 673 70 088 814	80 117 935 60 645 969	55 853 000 51 337 000	44 680 000 45 522 000	46 367 000 63 955 000	47 901 000 81 161 000	57 679 000 78 400 000
Zinc - Zinc kg - kg	\$106 650 304 129 002 037	122 438 035 147 610 457	125 104 245 159 709 355	143 911 352 187 809 913	205 600 051 213 323 454	172 556 000 175 685 000	159 764 000 133 604 000	229 110 000 213 523 000	269 951 000 234 883 000	426 321 000 303 000 000
Cadmium - Cadmium kg - kg	\$ 1 027 137	3 179 549	2 677 386						10 000 3 000	8 000 2 000
Bismuth - Bismuth kg - kg	\$								163 000 32 000	290 000 25 000
Tungsten Trioxide - Trioxyde de Tungstène(E) kg - kg	\$ 13 786 000 1 477 731	24 435 000 2 168 154	41 516 000 2 284 409	47 310 000 2 885 619	52 924 000 3 254 067	67 646 000 4 007 000	43 263 000 2 515 000	38 353 000 2 925 000	11 221 000 1 126 000	41 980 000 3 529 000
Arsenic Trioxide - (E) Trioxyde d'arsenic t	\$ t						561 000 1 094	3 862 000 1 780	2 345 000 982	229 000 4 684
Sand and Gravel - Sable et gravier t	\$ t							41 482 000 6 625 000	32 479 000 5 905 000	33 500 000 6 000 000
Stone - Pierre t	\$ t							1 268 000 323 000	14 601 000 2 409 000	15 750 000 2 420 000
Total	\$195 855 944	212 690 206	257 955 447	318 262 909	436 222 857	434 985 000	347 841 000	468 349 000	557 198 000	780 769 000

Source: Mineral Policy Sector, Energy, Mines and Resources and Northern Resources and Economic Planning, Indian Affairs and Northern Development.

(P) Preliminary Figures, (R) Revised Figures, (E) estimated.

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(P) chiffres provisoires (R) chiffres révisés (E) estimé.



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This report covers mines and mineral activities for the Yukon and Northwest Territories for the calendar year 1985.

The report was written and compiled by *T.W. Caine* and *D.D. Brown* of the Mining Resources Section, Ottawa. Sections on mineral exploration were based on exploration overviews produced by regional geological staff under the direction of J.A. Morin in the Yukon and W.A. Padgham in the Northwest Territories.

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Northwest Territories

Mineral shipments reported by Statistics Canada as mineral production in the Northwest Territories during calendar year 1985 were estimated to have a value of \$653.6 million compared with \$746.4 million during 1984. Much of the decrease in production value was due to the sharp decline in zinc prices during the year and low gold prices.

Ten mines operated in the N.W.T. at the beginning of 1985. However, low silver prices forced *Terra Mines Ltd.* to close its Silver Bear Mine in the Camsell River area in April. Also, low gold prices caused concern at some gold mines and led to the closing of *Royex Gold Mining Corporation's* small Shear Lake Mine in early September.

The leading zinc and lead producer, the Pine Point Mine put out about the same amount of concentrate as during the previous year, while the Polaris Mine increased its zinc and lead output by 10 percent and 7 percent respectively over the previous year. At year's end, *Pine Point Mines Limited* announced production plans to maximize production rates for 1986 and 1987 from the best ore sources available to respond to unanticipated and continuing depressed metal prices.

Combined production of gold from the Lupin, Con, Giant, Shear Lake and Salmita mines increased by seven percent over the previous year. Operations at Canada Tungsten's tungsten mine and at the Nanisivik zinc-lead-silver mine continued normally despite the depressed tungsten, zinc and lead prices.

Exploration activities in the N.W.T. showed significant recovery during the year with expenditures totaling approximately \$45 million compared with a peak of \$50 million during 1981. More than half of the 1985 expenditures were directed to gold exploration in Slave structural province, District of Mackenzie. Another 10 percent was directed to gold exploration in District of Keewatin. Large expenditures were made on the Bullmoose Lake gold property and Thor Lake beryllium - rare earth property.

In recent years gold exploration results have been encouraging in the volcano-sedimentary belts of Slave Province and activity has been centred on the Indin Lake, Courageous Lake-MacKay Lake, Point Lake, Central (or Olga Lake) and Yellowknife sedimentary-volcanic belts. On the development side,

Terra Mines Ltd. continued to drill its Bullmoose Lake gold property, east of Yellowknife, in order to prove up sufficient reserves for a production decision. Also, *Highwood Resources Ltd.* completed a decline and bulk sampled the beryllium-bearing T zone on its Thor Lake property, southeast of Yellowknife. In the Yellowknife area, *Goldrich Resources Inc.* in joint venture with *Tremenco Resources Ltd.* commenced the driving of a decline on its Tom property during October 1985, in preparation for small-scale gold production in early 1986. The decline portal is about 1 200 m north-northwest of the Ptarmigan Mine.

Yukon

Mineral shipments in the Yukon during the calendar year 1985 were estimated to have a value of \$57.9 million compared with \$70.1 million in the previous year. The Yukon placer gold mining industry was again the leading component of the mining industry. Some 150 to 175 seasonal placer operators operated during the year to produce 3 098 kg of gold (98 000 troy ounces) valued at \$43.1 million. This output represented 74 percent of the Yukon's total mineral production. While placer gold output increased 4.6 percent from the previous year, the value of this production declined by 3 percent because of lower gold prices during 1985.

Most of the remainder of Yukon's mineral production value came from the territory's only year-round operating silver mine, the *United Keno Hill Mines Limited* operation at Elsa and three other small seasonal silver mine operations. The seasonal lode mines were operated by *Archer, Cathro and Associates (1981) Limited*, *Springmount Operating Company Ltd.* and *Dawson Eldorado Mines Ltd.*

Cyprus Anvil Mining Corporation's Faro Mine and mill did not operate during 1985. A waste stripping program was terminated in late 1984 by Cyprus Anvil. However, in November 1985, the Faro Mine was sold to *Curragh Resources Corporation*. Curragh started stripping operations in December, 1985, with 100 new employees. Zinc and lead concentrate production will commence in mid-1986 following such pre-production development as additional waste stripping and tune up of the mill.

Exploration in 1985 was centred on precious metals prospects, particularly gold in the Mount Skukum-Wheaton River-Montana Mountain areas southwest of

Whitehorse, the Dawson Range west of Carmacks and the Ketz River property, south of Ross River. Also, *United Keno Hill Mines Limited* continued its major exploration effort with expenditures of \$4.7 million on its silver properties in the Keno Hill-Galena Hill mining camp. Its efforts were rewarded in March, 1986 with the uncovering of a major silver lode at its Bellekeno Mine property.

On the Ketz River property south of Ross River, *Canamax Resources Inc.* proved up promising gold reserves by drilling and underground bulk sampling. In 1986, further underground and surface exploration, estimated to cost \$3 million, will provide a base for a feasibility study. This will lead to a possible production decision by year-end 1986 or early 1987. At Canamax's Mt. Hundere property, north of Watson Lake, over two million tonnes of zinc-lead-silver resources were outlined by drilling during the year.

At Mount Skukum, *Total Erickson Resources Ltd.* proceeded with construction of its 300 tpd mill near its Cirque (or Main) gold deposit. The mine started up in March, 1986 and is expected to have a life of three years based on present ore reserves.

Northwest Territories

Mineral Production

Mineral shipments¹ in the Northwest Territories during the calendar year 1985 was valued at \$653.6 million compared with \$748 million in 1984. Much of the decrease in production value was due to a sharp decline in zinc prices during the year, lower gold prices and reduced silver output.

Base metal production increased by 3.0 percent despite weak zinc and lead prices. Combined mine-reported production² of the Northwest Territories' three zinc-lead producers, Pine Point, Polaris and Nanisivik, amounted to 344 319 t of zinc and 96 675 t of lead during the year. In December, Pine Point Mines Limited announced that it would mine and mill its most economic ore at full production rates during 1986 and 1987 in order to sustain the mine operation in view of unanticipated and continuing depressed zinc and lead prices. Under the revised production plan, operations will continue at least into 1987, but the future of the mine beyond 1987 is uncertain.

Combined mine-reported gold production from the Northwest Territories' five producers, the Lupin, Con, Shear Lake, Giant and Salmita mines, increased by 2.7 percent from the previous year, but gold prices remained low during 1985.

Canada Tungsten Mining Corporation Limited produced more tungsten in 1985 than during the previous year, but tungsten prices remained weak. Despite current depressed prices Canada Tungsten sees the Mactung Mine property in the N.W.T. as a world class tungsten property that it will acquire during 1986 from its parent Amax Inc.

Ten mines operated in the N.W.T. at the beginning of 1985. Low gold and silver prices during the year forced *Terra Mines Ltd.* to close its Silver Bear silver mine in April and *Royex Gold Mining Corporation* closed its small Shear Lake gold mine in early September. A summary of mineral production from the operating mines is given in Table 1.

The mineral industry of the N.W.T. accounted for 87.5 percent of the tungsten, 29.4 percent of the lead, 26 percent of the zinc, 15.1 percent of the gold and 2.8 percent of the silver produced in Canada during 1985. The value of these metals accounted for 7.2 percent of Canada's metallic mineral production in 1985 compared with 8.5 percent in 1984.

Operating mines and mills in the N.W.T. employed an average of 2 503 persons during 1985.

Table 1
Mineral Production of Operating Mines
Northwest Territories, 1984 and 1985

Company, Mine and Commodity	1984		1985	
	t	kg	t	kg
<i>Canada Tungsten Mining Corporation Limited</i>				
tungsten trioxide	3 528		3 717	
<i>Cominco Ltd.</i>				
Con Mine				
gold		2 772		2 427
silver		554.4		633
arsenic trioxide	1 269		1 100	
<i>Polaris Mine</i>				
zinc	110 483		117 804	
lead	28 439		39 300	
<i>Echo Bay Mines Ltd.</i>				
Lupin Mine				
gold		5 645.6		6 069
silver		820		1 186
<i>Giant Yellowknife Mines Limited</i>				
Giant Mine				
gold		1 997.4		2 030
silver		340.8		568
arsenic trioxide	3 415		1 600	
<i>Salmita Mine</i>				
gold		1 381.1		1 981
silver		262.4		359.7
<i>Nanisivik Mines Ltd.</i>				
zinc	67 682		60 956	
lead	6 996		5 144	
silver		27 061		23 512
<i>Pine Point Mines Limited</i>				
zinc	163 430		161 379	
lead	51 093		56 174	

¹ Statistics Canada reports "mineral shipments" from the mine establishments as mineral production.

² Reported by mining companies to the Government of the Northwest Territories and the Department of Indian Affairs and Northern Development.

Table 1 (continued)
Mineral Production of Operating Mines
Northwest Territories, 1984 and 1985

Company, Mine and Commodity	1984		1985	
	t	kg	t	kg
<i>Royex Gold Mining Corporation</i>				
B Zone and Shear Lake Mines				
gold		872.5		407
silver		68.1		34.5
<i>Terra Mines Ltd.</i>				
silver		24 620.5		6 746

Sources:

Department of Indian Affairs and Northern Development and the Government of the Northwest Territories. These production figures are those reported by the mines as production and may not match statistics Canada production figures which are based on metals sold or shipped.

Mines

Canada Tungsten Mining Corporation Limited

Canada Tungsten Mining Corporation Limited's Cantung Mine (a)* produced 3 717.5 t of tungsten trioxide (WO₃) contained in scheelite concentrate in 1985 compared with 3 528 t in 1984. Operations during the year were routine despite the depressed tungsten market. Ore reserves at year's end were sufficient for an additional four years of production, but the company was in the process of revising its estimated reserves.

Type:	Underground
Location:	Tungsten
Product:	Tungsten in scheelite concentrate
Mill Capacity:	1 000 tpd
Tonnes milled:	345 828 t
Reserves:	1.39 million t (Dec. 31, 1985)
Reserve Grade:	1.24% WO ₃
Employees:	211

* Numbers or letters in parentheses indicate the location of the property on the map in the centerfold.

Cominco Ltd.-Con Mine

The Con Mine (c) in Yellowknife was been operating since 1938 and is the oldest producing mine in the N.W.T. The Con Mill treated 197 700 t of ore in 1985 to produce 2 427 kg of gold and 633 kg of silver.

The company completed its \$9.6 million project to deepen the Robertson Shaft by 247 m to a depth of 1 900 m. The project will open another three levels to give access to at least 725 000 t of ore grading about 13.7 g of gold per t.

Type:	Underground
Location:	1.4 km south of Yellowknife
Product:	Gold, silver
Mill Capacity:	590 tpd
Tonnes Milled:	197 700 t
Reserves:	1.50 million t (Dec. 31, 1985)
Reserve grade:	14.4 g/t gold
Employees:	347

Cominco Ltd.-Polaris Mine

Cominco's Polaris zinc-lead mine (i), located on Little Cornwallis Island, N.W.T., is the world's most northerly base metal mine. Concentrate production is shipped over a 12-week season at the end of the Arctic summer when the sea is open for navigation.

Innovative low-cost improvements in operating practices resulted in the milling of 939 000 t of ore in 1985, well above the rated mill capacity. Zinc and lead production were both above last year's level by 10 percent and 7 percent respectively. Production amounted to 190 700 t of zinc concentrate containing 117 804 t of zinc and 39 300 t of lead concentrate containing 29 984 t of lead.

Initial development of the lower portion of the Polaris deposit called the "Keel Zone" was completed. The southern part of the Keel Zone supplied 90 percent of the ore milled in 1985.

Type:	Underground
Location:	100 km northwest of Resolute
Product:	Zinc, lead
Mill Capacity:	2 100 tpd
Tonnes Milled:	939 000 t
Reserves:	19.1 million t (Dec. 31, 1985)
Reserve Grade:	14.3% zinc and 3.8% lead
Employees:	269

Echo Bay Mines Ltd.-Lupin Mine

The Lupin gold mine's modern surface facilities (g) are compactly situated on the barrenlands near the west shore of Contwoyto Lake, 400 km northeast of Yellowknife. The mine is Canada's second largest gold producer and a proven low cost operation. During 1985, the mine set a new record by producing 6 069 kg of gold and 1 186 kg of silver from 570 930 t of ore. The production increase was seven percent above the previous year when 5 645.6 kg of gold was shipped. In January, 1985, a \$16 million shaft sinking program was started to deepen the shaft from 390 m to 790 m by early 1987.

During the winter of 1984, Echo Bay again constructed a winter road, approximately 595 km from the Lupin Mine to Yellowknife. The annual resupply during the three months of the ice road operation during 1985 involved trucking 7 771 t of supplies and 14 547 m³ of fuel in 855 truck loads.

Reserves at year end 1985 amounted to 2.78 million t grading 11.69 g of gold per t with additional reserves indicated at depth. A development drift driven during the year on the 650 m-level confirmed the extension of the Centre Zone of the Lupin deposit to a depth of 650 m. This is approximately 304 m below the depth used to calculate Lupin's ore reserves. Additional reserves were also being outlined in the L-19 Zone, an extension of the deposit to the east of the East Zone. The company expects to double its reserve when underground development is complete.

Type:	Underground
Location:	400 km northeast of Yellowknife
Product:	Gold, silver
Mill Capacity:	1 030 tpd
Tonnes Milled:	570 930 t
Reserves:	2.78 million t (Dec. 31, 1985)
Grade:	11.07 g/t gold
Employees:	376

Giant Yellowknife Mines Limited-Giant Mine

Production at the Giant Mine, located slightly north of Yellowknife, (c) remained steady during 1985 with an output of 2 030 kg of gold and 568 kg of silver, compared with 1 997.4 kg of gold and 340.8 kg of silver in 1984. A decline from the UBC zone, north-west of Giant Mine's B Shaft was being driven near year end to give access to 16 300 t of ore. A second

decline was being driven 1.5 km north of the Supercrest Mine to give access to 38 000 t of ore.

As of December 31, 1985 proven and probable ore reserves amounted to 964 337 t grading 8.23 g gold per t. This figure is up marginally suggesting that underground exploration replaced the ore mined during the year.

Type:	Underground
Location:	2.4 km north of Yellowknife
Product:	Gold, silver
Mill Capacity:	1 000 tpd
Tonnes Milled:	302 349 t
Reserves:	964 337 t (Dec. 31, 1985)
Reserve Grade:	8.23 g/t gold
Employees:	295

Giant Yellowknife Mines Limited-Salmita Mine

The Salmita Mine (e) on Matthews Lake, 256 km northeast of Yellowknife, has emerged as a small but highly productive contributor to *Giant Yellowknife Mine Limited's* overall performance. For the year, the Salmita Mine produced 49.4 percent of the company's gold production, with output of 1 981 kg of gold compared with 2 030 kg from the Giant Mine at Yellowknife. Ore from the Salmita Mine is treated at the Tundra Mill, 5 km south of the mine. Salmita's output in 1985 increased to 64 535 t of ore grading 31.34 g of gold per t in 1985 from 55 062 t grading 26.06 g/t mined in the previous year.

In August, the company started sinking an internal 250 m shaft (winze) from the sixth to the tenth level at 500 m depth in the mine, to recover a high-grade ore zone. As of December 31, 1985, reserves at Salmita were 58 060 t grading 33.26 of gold per t, sufficient for one year of production.

Type:	Underground
Location:	256 km northeast of Yellowknife
Product:	Gold, silver
Tonnes Milled:	64 535 t
Reserves:	58 060 t (Dec. 31, 1985)
Reserve Grade:	33.26 g/t gold
Employees:	90

Nanisivik Mines Ltd.

Nanisivik Mines Ltd. (f), controlled by *Mineral Resources International Limited (MRI)*, is located 700 km north of the Arctic Circle, near Arctic Bay, Baffin Island. In 1985, the mill at the mine processed 1 950 tpd or 692 535 t of ore to yield 5 144 t of lead, 60 956 t of zinc and 23 512 kg of silver, all contained in concentrate. During the year, Nanisivik conducted a major exploration program in search for satellite ore zones, which could extend the life of the mine.

Type:	Underground
Location:	27 km east of Arctic Bay, Baffin Island
Product:	Zinc, lead, silver
Mill Capacity:	1 800 tpd
Tonnes Milled:	692 535 t (1 950 tpd)
Reserves:	3.15 million t (Jan. 31, 1985)
Reserve Grade:	9.5% zinc, 0.5% lead, silver is unspecified
Employees:	194

Pine Point Mines Limited

The Pine Point Mine (b) property covers the eastern portion of a Mississippi Valley-type zinc-lead district on the south side of Great Slave Lake. To date, some 87 deposits have been defined at Pine Point of which some 39 have been or are being mined. In 1985, Pine Point milled 2 137 298 t of ore to produce 56 174 t of lead and 161 379 t of zinc contained in 347 800 t of concentrate.

In December, the company announced revised production plans for 1986 and 1987 to maximize production rates from the most economic sources of ore available and to run the mill at full capacity. Also the overburden strip ratio will be reduced. All of these measures are being taken because of unanticipated ongoing low zinc and lead prices. Maximum milling rates will be used to reduce unit production costs and total fixed costs.

In 1985, 1.8 million t of ore was found on the property, including 0.4 million t in a new high grade deposit. However, on December 31, 1985 measured and indicated reserves were cut from 21.8 million t to 14.3 million t, the latter grading 6.3 percent zinc and 4.3 percent lead. During 1986 and 1987, approximately 4.7 million t of the highest grade ore, grading 8.5 percent zinc and 3.9 percent lead will be mined.

Beyond 1987, the continuing operation of the mine will depend in large measure on an improvement in the price for zinc and lead. Currently, the life of the mine beyond mid-1987 is uncertain.

Type:	Principally open pit with one underground mine
Location:	Pine Point
Product:	Zinc, lead
Mill Capacity:	9 100 tpd
Tonnes Milled:	2 137 298 t
Reserves:	14.3 million t (Dec. 31, 1985)
Reserve Grade:	6.3% zinc and 4.3% lead
Employees:	571

Royex Gold Mining Corporation-Shear Lake Mine

The company's Shear Lake gold mine (h) came on stream in March, 1984, and in mid-1984, all production from the company's B-Zone Mine, 5 km to the south was halted. At the end of August, 1985, the Shear Lake Mine was closed because operations were unprofitable. During the year, the mill processed 82 055 t to produce 407 kg of gold and 34.5 kg of silver. Reserves calculated to March, 1985 and based on five veins were set at 953 000 t grading 7.20 g of gold per t. The B-Zone Mine (Cullaton Lake) has reserves of 81 000 t grading 16.8 g of gold per t.

Type:	Underground
Location:	Cullaton Lake area, 370 km south of Baker Lake
Product:	Gold, silver
Mill Capacity:	363 tpd
Tonnes Milled:	82 055 t
Reserves:	953 000 t (March, 1985)
Reserve Grade:	7.20 g/t gold
Employees:	126 during early 1985

Terra Mines Ltd.

Terra Mines Ltd. closed the last of its three silver mines in the Camsell River area (d) on March 31, 1985. The Silver Bear Mine, after 18 years of production, was no longer profitable because of low silver prices. During the first quarter of 1985, the Silver Bear Mine produced 5 791 t of ore to yield 6 746 kg of silver in concentrate.

Type:	Underground
Location:	Camsell River area, 15 km south of Great Bear Lake
Product:	Silver
Mill Capacity:	364 tpd
Tonnes Milled:	5 791 t (first quarter 1985)
Reserves:	not available
Employees:	24

Figure 1
Mineral Exploration Expenditures
Northwest Territories

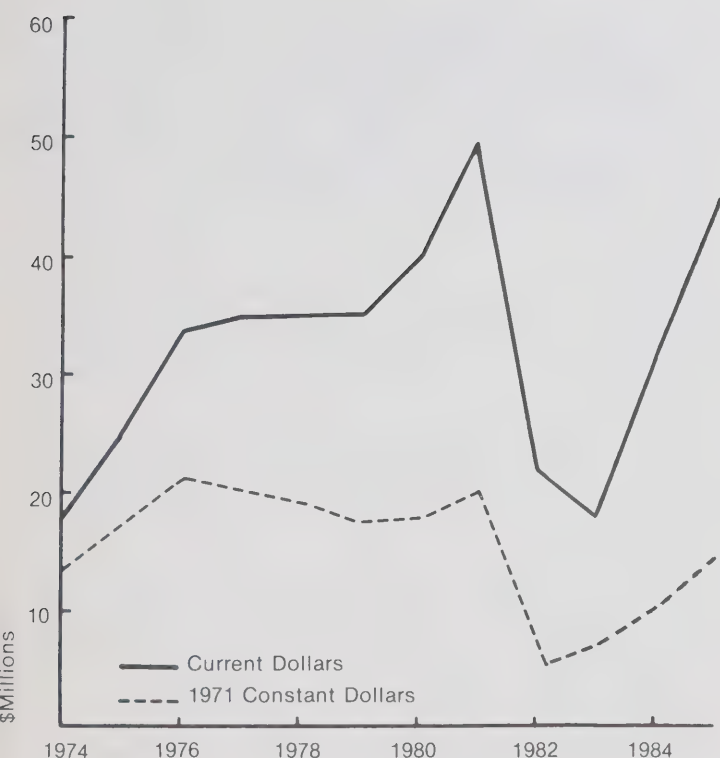


Table 2
Claims Staked in Northwest Territories,
1984 and 1985

Mining District	1985		1984	
	Claims Recorded	Area (Thousand Hectares)	Claims Recorded	Area (Thousand Hectares)
Arctic and Hudson Bay	64	50.70	81	48.9
Mackenzie	392	242.34	395	168.85
Nahanni	3	1.84	12	1.3
TOTAL	459	294.88	488	219.05

Mineral Exploration

Exploration and development expenditures in the Northwest Territories increased in 1985 to an estimated \$45 million from about \$40 million in 1984. More than half of the expenditures were directed to gold properties in the Slave structural province in the District of Mackenzie. About ten percent of total expenditures was represented by gold exploration in the District of Keewatin. Some 94 gold exploration projects were conducted with 79 in Slave Province, 5 in the Nahanni and 10 in the District of Keewatin. Ten projects were directed to uranium exploration and four projects to silver exploration. Out of a total of 136 projects in the territories, thirty-four involved diamond drilling and three involved underground development.

Development

Terra Mines Ltd.'s 1985 program at its Bullmoose Lake gold property (5) included underground development, surface and underground drilling and the construction of an airstrip. A 68 tpd pilot mill will be moved onto the property in early 1986 and 61 000 t of stockpiled ore will be processed as a pilot scale test. Upon successful completion of the test, Terra Mines plans to place the property into production in 1987, at 180 tpd, eventually building up to a mining rate of 540 tpd.

Highwood Resources Ltd. completed a large part of the work required for a feasibility study of its Thor Lake beryllium-rare earth metals property (39). The company drove a 490 m long decline to a depth of more than 80 m into the deposit after bringing in heavy equipment and supplies over a 105 km winter road constructed from Yellowknife. The metallurgical

results from large bulk samples will be used for a feasibility study leading to a production decision. The T Zone contains 1.63 million t grading 0.85 percent beryllium oxide and 431 000 t grading 0.2 percent yttrium oxide. South of the T Zone is a much larger area of mineralization called the Lake Zone with 63 million t grading 0.03 percent tantalum, 0.4 percent niobium (columbium) and 1.7 percent combined rare earth metals.

Tremingo Resources Ltd. began driving a decline on its Tom property, just south of Prosperous Lake (4), to develop existing gold reserves for initial mining early in 1986. The company expects to mine at a rate of 2 700 t of ore per month from proven reserves which total 13 600 t.

Gold

Gold Exploration in Slave Structural Province

Aber Resources Ltd. in a joint venture with *Bow Valley Industries Ltd.* conducted geophysical and geological surveys over a number of iron formations on the BARB and FIN claims in the Contwoyto Lake area (g) near the Lupin Mine. In the same area, *Aber Resources Ltd.* and *Highwood Resources Ltd.* optioned approximately 6 000 ha of roughly 12 000 ha of the ground acquired by the Cominco-Cogema Joint Venture. Results of an airborne EM survey conducted by the latter companies over this ground will be followed up in 1986.

Mapping, geophysics and prospecting were conducted on *Aber Resources Ltd.*'s A.P. claims at Cameron River (4), 64 km northeast of Yellowknife, and a target area was found. On the BLACKRIDGE claim, in the Hood River area (13), the company conducted VLF-EM and magnetometer surveys. Drilling on the claim intersected some erratic gold mineralization.

The *Back River Joint Venture* drilled targets on Prospecting Permit 973 near George Lake (11) and conducted work on their main block of 15 prospecting permits adjoining permit 973.

Blackridge Gold Ltd. conducted work around a small gold deposit on the MQ 1 claim at the south and of Gordon Lake (4) and as well as on the AUR, JAL and MCC claims in the surrounding area.

Bow Valley Industries Ltd. in joint venture with *Aber Resources Ltd.* flew an airborne IMPUT EM and magnetometer survey over its major land position surrounding Echo Bay's Lupin Mine(g). The bulk of the area is joint venture ground held by *Aber Resources Ltd.*, *Great Bear Development Corp.* and *Viscount Resources Ltd.* Numerous line grids were set up and geological mapping, EM and magnetometer surveys and drilling were carried out.

Brinco Limited under an agreement with *Consort Energy Corp.* and *Roxwell Gold Mines Ltd.* drilled EM conductors on the WEST claims (g) near the Lupin Mine.

Canuc Resources Inc. prepared a calculation of proven and probable resources on its Arcadia property (40) based on 1985 drilling conducted by *Echo Bay Mines Ltd.* Proven resources amount to 668 595 t grading 7.2 g of gold per t and probable resources amount to 91 626 t at 8.6 g of gold per t.

Comaplex Resources International Ltd., through Wollex (a division of Comaplex) explored the CHAL, EDE and CDC claims in the Indin Lake area (8).

Cominco Ltd. conducted airborne and ground EM and magnetometer surveys in the Contwoyto Lake area (g) in joint venture with *Cogema Canada Limited*. Cominco also explored the BUGOW claims at Russell Lake (3) by magnetometer and geological surveys and by diamond drilling. In the Courageous Lake area (e), Cominco in a joint venture with *Giant Yellowknife Mines Ltd.* drilled three holes on the BS claims, acquired from *Roxwell Gold Mines Limited*. In the Indin Lake area (8), the joint venture explored the BON claim.

In the Back River area (10), *Cominco Ltd.* explored the BEE and IM claims and three prospecting permits by geological mapping, magnetometer, VLF-EM and geochemical surveys.

Corolla Resources Ltd. completed soil and rock geochemistry surveys and a detailed VLF-EM survey over its STORM, PAN and CALM claims in the Consolidation Lake area (5).

Cove Energy Corporation drilled a geochemical, EM and magnetometer anomaly on its TANIA (Webb Lake) property (4). Gold bearing veins occur on the property.

Cruiser Minerals Ltd. completed a magnetometer survey on its MQ gold property near Gordon Lake (4).

Delaware Resources Corp. flew an airborne EM survey over its claims in the Indin Lake - Wijinnedi Lake area (8). *Manson Creek Resources Ltd.* also flew an airborne EM survey over part of the DAVE claim block (8).

Work by *Echo Bay Mines Ltd.* on the KIM claims at Lex Lake (8) in the Indin Lake belt included drilling 38 holes to provide ore definition in the Main Zone. The company acted as operator of a joint venture with *Petromet Resources Limited* and *Comaplex Resources International Ltd.* The gold zone has been expanded to 750 m along strike and to a depth of 90 m. The CASS showing, 3 km to the southwest of the Main Zone, is part of a series of gold occurrences.

Echo Bay Mines Ltd. conducted helicopter-borne EM and magnetometer surveys over claims in the Itchen-Contwoyto Lake area (9). Mapping, geophysics, trenching and drilling were carried out on the RUSH, CUB and F claims (9). Around Bathurst Inlet, Echo Bay explored the HEN claims and drilled the HUNT claims (12).

In the Indin Lake gold belt (8), *Frontier Gold Mines Ltd.* undertook preliminary exploration on its SANDRA and CATHY claims.

Genesis Resources Corp. mapped the JOON property (5) near Bullmoose Lake. EM and geochemical surveys detected a number of anomalous zones.

Giant Bay Resources Ltd. resumed exploration of its gold prospects at Knight Bay, Gordon Lake (4). Work included drilling of fourteen holes in four zones and geophysical surveys. The company announced that drill-indicated resources for the No. 1 zone on the property are 634 000 t grading 5.14 g of gold per t to the 150 m level. Since much of the zone is near the surface, it is likely that future mining would be by open pit to a 60 m depth. To this depth resources have been calculated as 280 275 t grading 4.53 g of gold per t. Two high grade gold zones called the T-11 and Wooferine were discovered in 1985 about 1.5 km north of the No. 1 Zone and five drill holes yielded encouraging results. In 1986, *Giant Bay Resources Ltd.* will be driving a 490 m long decline on the property and both surface and underground drilling are proposed.

Giant Yellowknife Mines Ltd. announced that ore values were obtained by drilling the RED claims, about 3 km north of the Salmita Mine (e) in the Courageous Lake – MacKay Lake volcanic belt. The company will resume drilling in 1986 and explore the TMK claims in the northern part of the belt. Also, three of six drill holes put down within 300 m of the present workings of the Salmita Mine encountered significant gold values.

Giant Yellowknife Mines Ltd. also drilled near the Crestaurum Mine (c) in the Yellowknife area. The company conducted reconnaissance exploration work on the KA1 claim at Bridge Lake (6), on the ALGOOD claims at Regan Lake (10) and the TREE claims near Point Lake (9).

Golden Marlin Mines Ltd. explored the MARLIN claims in Yellowknife Bay (c). Work included an IP survey, an airborne magnetometer and EM survey and a waterborn seismic survey.

Golden Rule Resources Ltd. flew an EM survey over its claims in the Indin Lake area (8).

Halferdahl and Associates Ltd. on behalf of an Edmonton – based syndicate, explored the PRO claim group in the Walsh and Prosperous lakes area (4), by geological and geochemical surveys.

Hecla Mining Company of Canada Ltd. conducted an EM and magnetometer survey over the JOHN, SHIN and DLER claims (g), in the Contwoyto Lake area. Ground geophysics and geological mapping are proposed for 1986.

Hidden Lake Gold Mines Ltd. conducted an airborne EM and magnetometer survey over its GOLD claim in the Contwoyto Lake region (g).

Walt Humphries and Associates conducted some exploration work on old showings on the WAL, TING and EQUINOX claims in the Walsh Lake area (4).

Lightning Minerals Inc. acquired the TT gold (3) property from *Terra Mines Ltd.* Terra completed a program of trenching and 2 286 m of drilling on the property.

Noranda Inc. announced that a significant new gold deposit was tested during 1984 in the Matthews Lake – Courageous Lake area under the company's Tundra Project (e). Work during 1985 was conducted on the BERTHA and FAT claims. Also magnetometer and EM surveys were conducted over a grid covering the CAROL 1 and 2 claims and part of the FAT, STOUT and TALL claims.

Noranda Exploration Company, Limited performed geological reconnaissance work over several claim blocks in the Beaulieu River, Detour and Victory lakes areas (4). In the Clan Lake area (5), north of Yellowknife, Noranda prospected and conducted reconnaissance work on the BOSS claims. Noranda also staked and prospected in the Russell and Slemon lakes area (3).

In the Chalco Lake area, near Indin Lake (8), Noranda carried out geophysical surveys and mapping on the STEAL and BAT claims optioned from *Petromet Resources Ltd.* Noranda also explored the BETAM and BRINK claims between Indin and Damoti lakes (8).

In the Point Lake – Itchen Lake area (9), Noranda staked and prospected the KES, KAR and MAX claims.

Placer Development Limited explored several claims in or near the Courageous Lake volcanic belt (e), including the COU, AL, MIST and FOG claims. In the Indin Lake volcanic belt (8), Placer explored the OTI and SPAN claim blocks, which were optioned from *Petromet Resources Limited* and *Comaplex Resources, Inc.* Several gold showings were covered by magnetometer and EM surveys.

Ryan Energy Corp. optioned the WT claims (4) near Yellowknife from *Cameron Holdings Ltd.* and excavated some 30 trenches.

Silver Hart Mines Ltd. explored claims near Pistol Lake (13) in an agreement with *Gold Fields Mining Corporation*, together with claims owned by the company. An aggregate of 4 876 m of diamond drilling was conducted in 1985. The drilling yielded encouraging gold-bearing intersections.

Suncor Inc., in joint venture with *Treasure Island Resources Corporation*, explored the latter's DAN gold property on Spider Lake (8) by an airborne EM and magnetometer survey and by excavating two trenches on Treasure Island. In the nearby Laurie Lake area (8), they explored the LONG and PEG LEG 1 claims by EM and magnetometer surveys on three grids, and by rock sampling.

Terra Mines Ltd.'s 1985 program at its Bullmoose Lake gold property (5) included underground development, surface and underground diamond drilling and some geological surveying. The airstrip to the north of the mine was extended to accommodate larger aircraft.

Gold Exploration in the District of Keewatin

Aberford Resources Ltd. (now *Abermin Corporation*) explored its five new exploration permits south of Yathkyed Lake (16) in search of lateral extensions of gold-bearing sulphide zones detected last year.

Borealis Exploration Limited acquired a prospecting permit southwest of the Ferguson River (18). The company worked on a gold showing on claims on the southern edge of the prospecting permit. The showing, was discovered and trenched by *Hudson Bay Mining and Smelting Co., Ltd.* in the late 1940's. It consists of gold-bearing quartz-chalcopryrite veins in sheared andesite. Work on the property will continue and drilling is planned during the 1985/86 winter season and in early 1986.

Canadian Nickel Company Limited worked on its prospecting permits northwest of Whale Cove (19) on Hudson Bay. In May, geophysical surveys were conducted on a gold showing northwest of the airstrip at Whale Cove.

Comaplex Resources International Ltd. prospected and conducted limited geophysical work on its claims east of Judge Sissons Lake (15). The company also prospected on its permits north of Whitehalls Lake (14) and northwest of Tehek Lake (14).

Gold Exploration in Nahanni District

Most of the mineral exploration in Nahanni District during 1985 was for placer gold. E. Barnes operated a small sluice box on Borden and Bennett creeks (2) and several small gold nuggets were found. Prospectors M. and P. Jones prospected between Spruce and Jack Pine lakes (2), but no gold was found. Prospector E. Linberg searched for gold and tungsten around the headwaters of the Brokenshell River (1).

Gold Exploration in the Arctic Region

Borealis Exploration Limited conducted some exploration work for gold on its prospecting permits on the Melville Peninsula (20).

Uranium

CEGB Exploration (Canada) Ltd. explored its prospecting permits in the Great Bear Lake – Dumas Lake area (34) by prospecting, geological mapping and soil sampling. This was the only reported work conducted during 1985 in the Bear Province.

PNC Exploration (Canada) Ltd. drilled fifteen holes on the DVB claims near Dunkel Lake (31) on the east side of the Dubawnt basin. A winter geophysical program, consisting of gradiometer and various types of EM surveys, was conducted on prospecting permits 1071 and 1072 (32) on the west side of Dunkel Lake, near Eyeberry Lake. PNC also drilled uranium targets near the Nonacho Group – basement unconformity between Salkeld Lake and southern Hjalmar Lake (33).

Urangesellschaft Canada Limited conducted geological, geophysical and geochemical surveys near its Lone Gull property (29). Deep holes were drilled into the Lone Gull deposit to determine the down-dip extent of the mineralization. Also, three anomalous areas and two new showings that were discovered in 1984 were drilled.

Base Metals

Asamera Inc. inspected the surface and underground workings of the Prairie Creek lead-zinc-silver mine (27) of *Cadillac Explorations Limited* and *Procan Exploration Company Ltd.* Cadillac's 60 percent interest in the mine was up for sale.

Cominco Ltd. continued to define the limits of its Polaris deposit on Little Cornwallis Island (i) by drilling. Similar drilling in 1984 increased the total measured and indicated reserves of the mine by 3.1 million t or 18 percent of total reserves.

Highwood Resources Ltd. staked cobalt-nickel arsenide deposits on Blanchet Island (25) on the east arm of Great Slave Lake.

Nanisivik Mines Ltd. conducted a major exploration program to drill test satellite sulphide zones on the Nanisivik Mine's mineral leases (f) in northern Baffin Island. Geophysical surveys on claims staked in 1984, west of the Nanisivik Mine, outlined EM conductive zones.

Panarctic Oils Ltd. drilled several holes to test the copper-silver potential of selected targets on its prospecting permits that cover much of the Minto Arch of Victoria Island (21).

Petro-Canada drill tested a fault-controlled silver-barite-galena showing in Adams Sound Formation quartzites at Elwin Inlet, northern Baffin Island (22).

Pine Point Mines Limited continued to explore its mine property (b) on the south side of Great Slave Lake in search of Mississippi Valley-type ore deposits. During the year 1.8 million t of ore were found, including 0.4 million t in one new high-grade deposit with a low strip ratio. However, after accounting for new ore located in 1985, reserves were cut by 35 percent from 21.8 million t at 1984 year-end to 14.3 million t at 1985 year end. The company also completed three drill holes on the JMBS claims west of the Buffalo River (26).

Other Commodities

Erex International Ltd. trenched on its BET 1-2 claims on Drever Lake (4) to the northeast of Blatchford Lake as part of its lithium exploration effort. In July, *Equinox Resources Ltd.* acquired from *Erex International Ltd.* up to 88 percent interest in 68 mineral claims in eleven separate groups, east of Yellowknife. During 1975-1979, *Canadian Superior Exploration Ltd.* outlined resources in pegmatites amounting to 37.6 million t grading 1.37 percent lithium oxide (LiO₂), mainly as spodumene pegmatites.

Highwood Resources Ltd. drove a 500 m long decline on its Thor Lake beryllium-yttrium-tantalum-columbium-rare earth metals property (39). Large bulk samples were removed and shipped for metallurgical testing as part of a major feasibility study.

Selco Inc. conducted heavy mineral stream sampling along the Mackenzie Valley (38) and examined several diatremes in the Mackenzie Mountains (36, 37) in search of diamonds. In 1981, *Superior Oil Ltd.* and *Falconbridge Limited* found several microscopic diamonds in concentrates taken from the Mountain Diatreme in the Mackenzie Mountains. Also, kimberlite indicator minerals have been found in the Blackwater River area, east of the Mackenzie River.

J.S. Vincent, carried out trenching on his BIN, LENS, MUT and HID (5) claims in the Mystery Lake area east of Yellowknife, in exploration for tantalum and tin.

Tantalum Mining Corporation of Canada Ltd. continued a lithogeochemical study on its TCS and COVE claims in the Thompson Lake area (4). Pegmatites in this area contain columbium, tantalum and tin minerals.



MINERAL EXPLORATION AND MINING NORTHWEST TERRITORIES — 1985

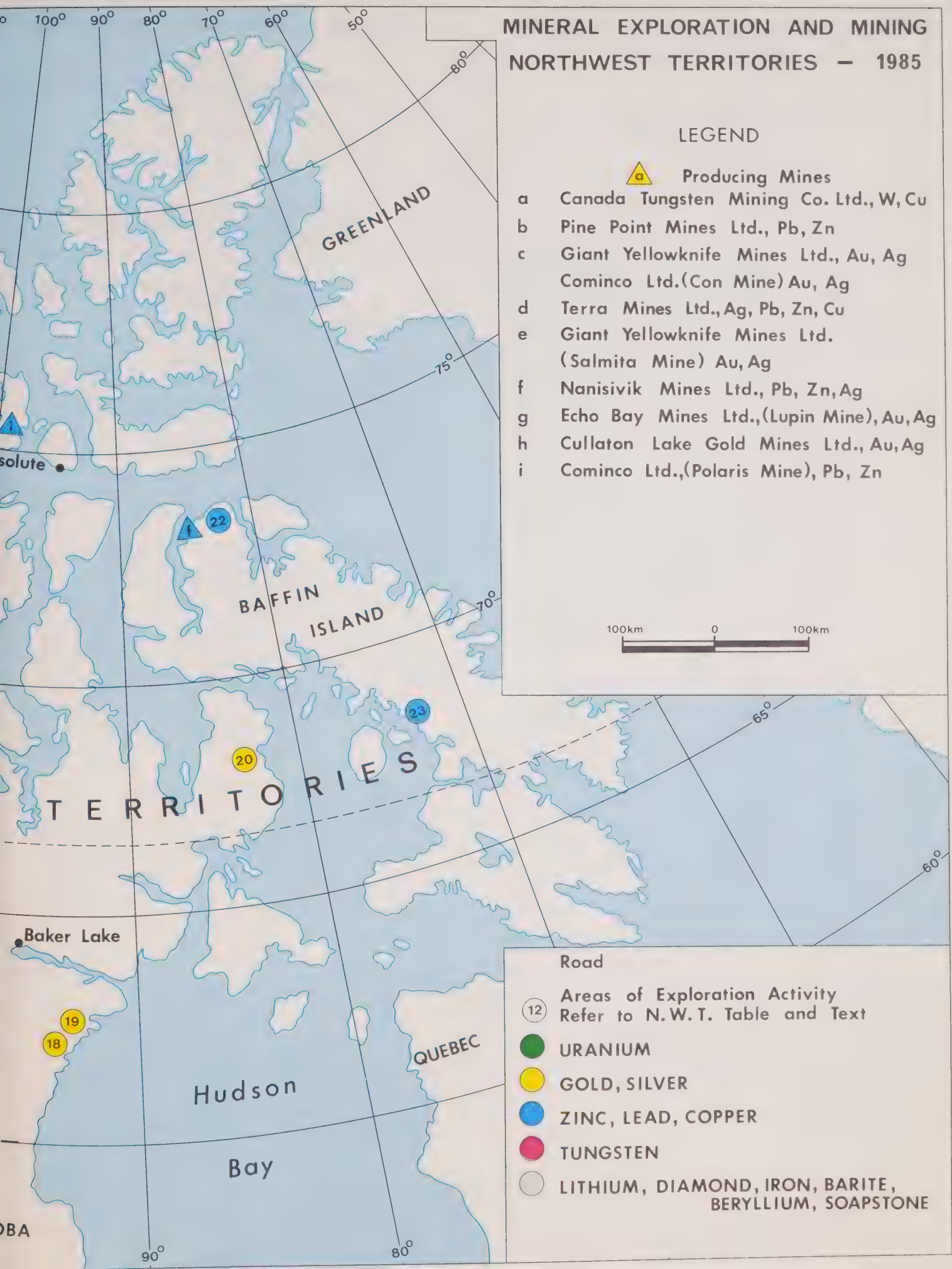
LEGEND



Producing Mines

- a Canada Tungsten Mining Co. Ltd., W, Cu
- b Pine Point Mines Ltd., Pb, Zn
- c Giant Yellowknife Mines Ltd., Au, Ag
Cominco Ltd. (Con Mine) Au, Ag
- d Terra Mines Ltd., Ag, Pb, Zn, Cu
- e Giant Yellowknife Mines Ltd.
(Salmita Mine) Au, Ag
- f Nanisivik Mines Ltd., Pb, Zn, Ag
- g Echo Bay Mines Ltd., (Lupin Mine), Au, Ag
- h Cullaton Lake Gold Mines Ltd., Au, Ag
- i Cominco Ltd., (Polaris Mine), Pb, Zn

100km 0 100km



Road

12 Areas of Exploration Activity
Refer to N.W.T. Table and Text

- 12 URANIUM
- 19 GOLD, SILVER
- 20 ZINC, LEAD, COPPER
- 21 TUNGSTEN
- 22 LITHIUM, DIAMOND, IRON, BARITE,
BERYLLIUM, SOAPSTONE

YUKON MINERAL EXPLORATION AND MINING - 1985

LEGEND



Producing Hardrock Mine

a United Keno Hill Mines Ltd., Ag, Pb, Zn, Cd
Archer, Cathro & Associates Ltd., Ag, Pb
Springmount Operating Co. Ltd., Ag, Pb

b Cyprus Anvil Mining Corp. Ltd., Pb, Zn, Ag

c Dawson Eldorado Gold Expl. Ltd., Ag, Pb

d Archer, Cathro & Associates Ltd., Ag

(21) Areas of Mineral Exploration Activity
Refer to Yukon Table and Text



LEAD-ZINC-SILVER



TUNGSTEN, TIN, MOLYBDENUM

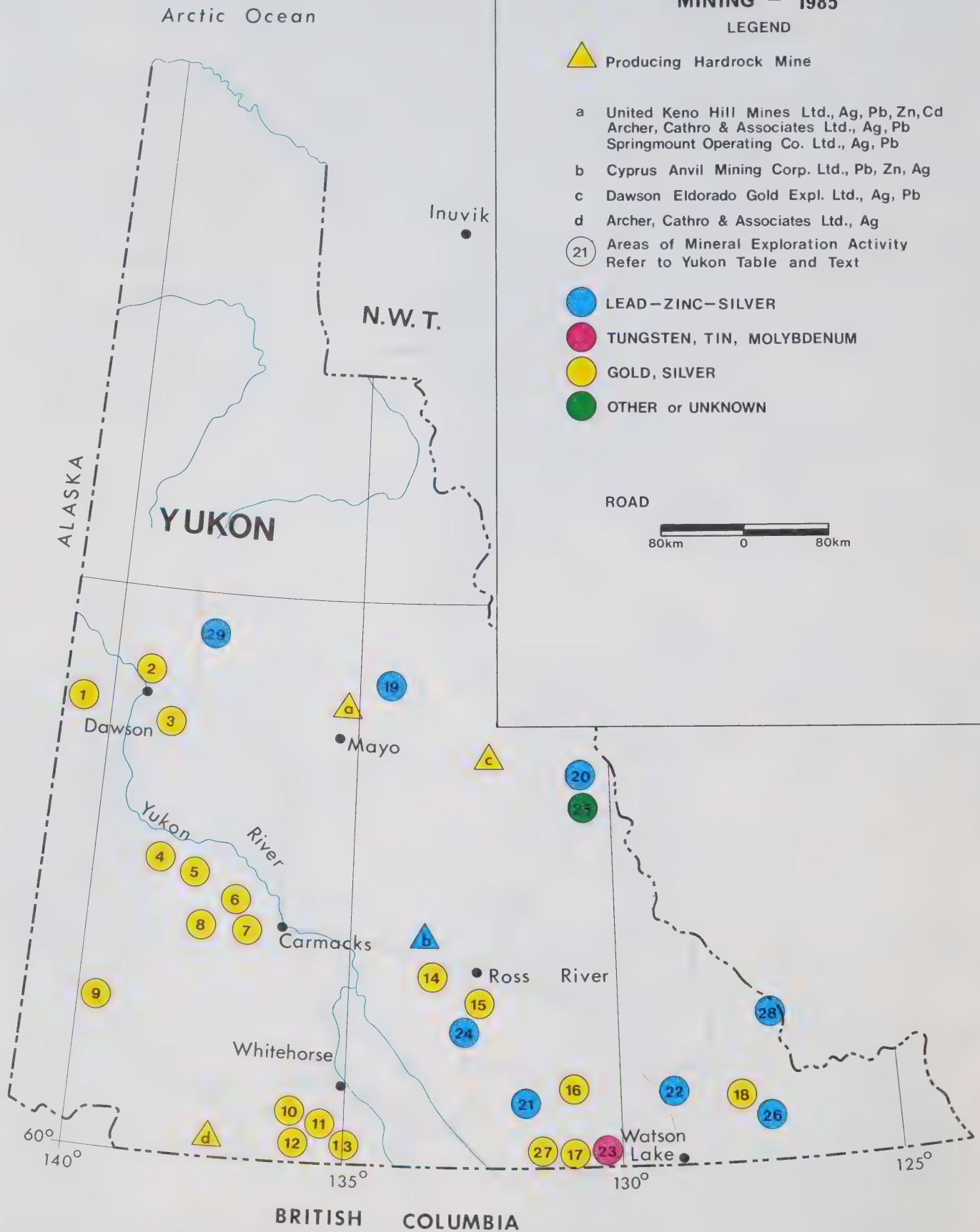
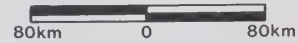


GOLD, SILVER



OTHER or UNKNOWN

ROAD



Yukon

Mineral Production

Mineral shipments in the Yukon during the calendar year 1985 were valued at \$57.9 million compared with \$70.1 million in 1984. Precious metals production again dominated mineral production value with gold and silver accounting for \$55.8 million or 96.3 per cent of total production value. The leading sector of the Yukon mining economy was the Yukon placer gold mining industry with a reported output according to royalty records of 3 048 kg of gold (98 000 troy ounces). An additional 50 kg of gold was sold to jewellery manufacturers in the Yukon.

The Yukon's only year-round lode mine, *United Keno Hill Mines Limited*, at Elsa (a) produced 39 585 kg of silver from its twelve mines during the year. Also, three small-scale seasonal silver mine operations contributed to the Yukon's silver output. In the Keno Hill-Galena Hill mining area, dominated by *United Keno Hill Mines Limited*, both *Archer, Cathro and Associates (1981) Limited* and *Springmount Operating Company Ltd.* mined small tonnages of silver ore for the third consecutive year. In the Rogue River area (c), *Dawson Eldorado Mines Ltd.* also operated its Plata-Inca silver mine for the third consecutive year.

Cyprus Anvil Mining Corporations' mine at Faro (b) did not operate during 1985. In November 1985, the property was sold to *Curragh Resources Corporation* and commencement of zinc and lead concentrate production is expected in June 1986. The sale of the property followed negotiations among *Dome Petroleum Limited*, the vendor with majority interest in Cyprus Anvil, *Curragh Resources Corporation*, the federal and territorial governments and other interest groups.

The Yukon accounted for 3.6 percent of the gold, 3.7 percent of the silver and 0.6 percent of the lead produced in Canada in 1985. The Yukon's mineral production value represented 0.7 percent of Canada's metallic mineral production in 1985 which remained the same as in 1984.

The Yukon lode (hard rock) mining industry employed 442 persons on a year-round basis including 37 at the Mount Skukum gold mine which was under development at the close of the year. The Yukon placer gold mining industry directly employed an estimated 500 persons at some 150 to 175 mine operations on a seasonal basis.

Table 3
Mineral Production of Operating Mines
Yukon Territories, 1984 and 1985

Company, Mine and Commodity	1984		1985	
	t	kg	t	kg
<i>Archer, Cathro and Associates (1981) Limited</i>				
Keno Hill area mines				
silver		1 554.8		2 787.9
lead	72.6		229.14	
Dalton Post area mines				
gold		—		0.24
silver		36.5		39.3
lead	0.84		0.96	
zinc	0.16		0.28	
<i>Curragh Resources Corporation</i>				
Faro Mine				
lead	—		—	
zinc	—		—	
silver		—		—
<i>Dawson Eldorado Mines Ltd.</i>				
Plata Mine				
silver		9 330		3 583
lead	1 360.8		589.6	
<i>Springmount Operating Company Ltd.</i>				
Keno Hill mines				
silver		5 845		550.9
lead	180		17.34	
<i>United Keno Hill Mines Limited</i>				
lead	879.5		975	
zinc	98.0			
silver		32 109		39 585

Sources:

Department of Indian Affairs and Northern Development. These production figures are those reported by the mines as production and may not match Statistics Canada production figures which are based on metals sold or shipped.

Mines

United Keno Hill Mines Limited

The company's mining operations at twelve mines in the Elsa area (a) produced 67 864 t of ore in 1985. The central mill turned out 39 585 kg of silver and 975 t of lead contained in concentrate. Under the pressure of low silver prices, the company employed fewer people and produced more ore and silver than during the previous year.

Type:	Underground mines and one open pit mine
Location:	Keno Hill-Galena Hill area, near Elsa
Product:	Silver-bearing lead concentrate
Mill Capacity:	450 tpd
Tonnes Milled:	67 864 t
Reserves:	164 924 t (Dec. 31, 1985)
Reserve Grade:	853.7 g silver per t, 3.2% lead
Employees:	176

Seasonal Small Lode Silver Mining Operations

Archer, Cathro and Associates (1981) Limited

The company mined the high-grade Shamrock vein during part of 1985, on a lease from *United Keno Hill Mines Limited* in the Keno Hill area (a). Approximately 313 t of galena ore grading 8 914 g of silver per t was mined from four crown pillars near the surface over old workings.

More a sampling operation than a mining operation, *Archer, Cathro and Associates (1981) Limited* also mined 11.5 t of silver-gold-lead-zinc-copper mineralization from *The Golden Shamrock Resource Corp.*'s WIL 1-8 (d) claims near Dalton Post. The material was shipped to Cominco's smelter at Trail, B.C.

Dawson Eldorado Mines Ltd.

The company, (formerly named *Dawson Eldorado Gold Explorations Ltd.*) enjoyed an excellent third year of silver production for the Plata-Inca Mine, 176 km northwest of Ross River (c). The company made three shipments of ore during the year totaling 907 t with an average grade of 3 950 g per t silver and 65 percent lead.

Springmount Operating Company Ltd.

Springmount Operating Company Ltd. mined 68 t of high-grade silver-lead - zinc ore from the Mt. Keno Mine in the Keno Hill area (a).

Placer Mining

Placer gold production, as represented by royalty records under the Yukon Placer Mining Act, remained at a high level during 1985, despite prevailing low gold prices. Some 150 to 175 placer operations produced 3 098 kg of gold compared with 2 946 kg reported in 1984.

Most of the mining operations are in the traditional mining areas including the Klondike, Sixty Mile, Mayo, Clear Creek and Kluane areas. Most of the gold produced in the Yukon was from small caterpillar tractor and sluice box operations that work from May to freeze up in the fall.

Three underground placer mines were worked in the frozen gravel in the Klondike area, near Dawson, during the winter of 1984-1985. *White Channel Underground Mining Ltd.* (1) and *King Solomon Mines Ltd.* (3) both mined the White Channel terrace gravel deposits. The third underground operator, *Klondike Underground Mining Ltd.*, mined the Jackson Hill (1) property, also in the Klondike area.

Staking activity related to placer mining was down in 1985. There were 1103 new claims and 150 new leases staked to December 31, 1985 compared with 1 843 new claims and 202 new leases staked to year end 1984. There were 14 493 placer claims, 240 placer leases and 6 dredging leases in good standing at the close of 1985.

Development

Total Erickson Resources Ltd. (formerly *Erickson Gold Mines Ltd.*), the operator of the Mount Skukum gold mine project, in joint venture with *AGIP Canada Ltd.*, proceeded with development of the 270 tpd mill and its Cirque (Main) vein deposit (11). The Cirque gold vein deposit was discovered in 1981. Construction at year-end was proceeding smoothly toward a March, 1986 start up. Measured reserves of the Cirque Zone amount to 164 000 t averaging 20.5 g of

gold per t, fully diluted. The mine will employ some 60 to 75 persons and will cost over \$5 million. The project employed an average of 37 persons in 1985.

At year end 1985, *Curragh Resources Corporation* was starting waste rock (overburden) removal at the Faro Mine (b) as preproduction development. The work force of 100 will gradually increase to some 450 permanent employees.

On the Ketz River gold property (15), 80 km south of Ross River, *Canamax Resources Inc.* and *Pacific Trans-Ocean Resources Ltd.* continued a major exploration and development program. In 1985, Canamax completed some 7 000 m of diamond drilling in sixty holes and drove a 465 m adit underground above the Ridge Zone into the Peel Zone. Bulk sampling of the Ridge Zone was conducted for metallurgical testing and a feasibility study. At the end of the previous year (1984), Canamax estimated reserves at 460 000 t grading 8.7 g of gold per t including a higher grade section of 185 000 t grading 13.37 g of gold per t. If the company goes into production in 1987, Ketz River will be a small mine of about 400 tpd. Also the majority of the underground development work will be completed during the exploration phase.

In the Elsa mine area (a), *United Keno Hill Mines Ltd.* continued a major exploration development program at a cost of \$4.7 million in 1985. A total of 8 997 m of rotary percussion drill holes were completed and adits were advanced on the Silver King, Lucky Queen and Bellekeno properties. Some 2 577 m of drifting and crosscutting were completed to explore the mineralized vein system.

Table 4
Quartz Claims Recorded in Yukon, 1984 and 1985

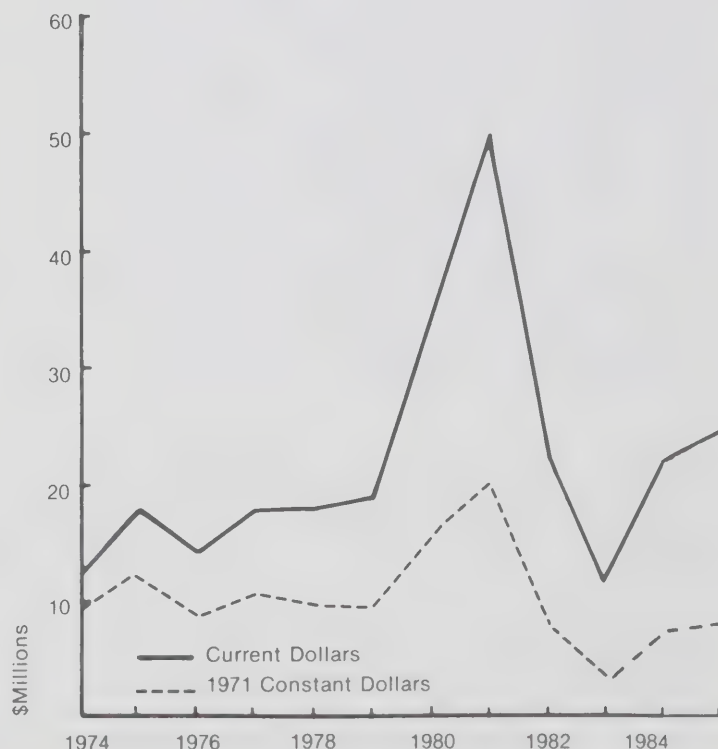
District	1985 Claims Recorded	1984 Claims Recorded
Dawson	386	2 823
Mayo	75	298
Watson Lake	1 323	1 975
Whitehorse	4 035	3 056
TOTAL	5 819	8 152

Mineral Exploration

Mineral exploration expenditures in the Yukon were estimated at \$25 million during 1985 compared with about \$22 million during 1984. As in the previous year, most of the exploration activity was for precious metals. The most active areas were the Wheaton River area (11), Rancheria area (17), Ketz River area (15) and the Mount Nansen/Mount Freegold area (6, 7), all of which contain precious metals properties.

Quartz claims (hardrock claims) in good standing at year end 1985 amounted to 46 301, down from 47 475 at year-end 1984. During 1985, 5 097 new quartz claims were staked. Most of the claims were located in the aforementioned active exploration areas. In addition, 23 coal leases were in good standing.

Figure 2
Mineral Exploration Expenditures
Yukon Territory



Gold and Silver

The Yukon saw continuing exploration emphasis on small high-grade precious metals deposits in 1985. Encouraged by the continuing development of *Total Erickson Resources Ltd.*'s Mount Skukum gold mine in the Wheaton River area (11), a number of companies actively explored in the surrounding Wheaton River Valley-Mount Skukum-Montana Mountain area. Players in the Rancheria District, which straddles the Yukon - B.C. border, 80 km west of Watson Lake, continued the search for other mantos silver deposits similar to *Regional Resource Ltd.*'s Midway silver discovery. In the St. Cyr Range, 80 km south of Ross River, *Canamax Resources Inc.* continued exploration and development of the significant Ketz River gold property. The property will undoubtedly become the next new lode mine in the Yukon. In the Dawson Range, northwest of Carmacks, a number of companies were in active exploration of gold targets believed to hold potential for heap leach mining.

Archer, Cathro and Associates (1981) Limited under an agreement with *Casino Silver Mines Ltd.* conducted trenching and percussion drilling on *Teck Corporation's* CASINO property (4). The property is well known for its large low-grade copper-molybdenum porphyry deposit. An oxidized portion of the deposit may be amenable to heap leaching for gold. Low-grade gold mineralization is widely distributed within the Casino subvolcanic porphyry complex. One zone on Carr Ridge is over 80 m wide and 300 m long and contains in excess of 0.75 g of gold per t. Archer, Cathro and Associates also conducted trenching and drilling on a property optioned in the Mount Freegold area (7). Gold grading 0.75 g to 2.09 g per t was intersected in seven zones to a depth of 60 m.

BP Canada Inc. financed a drill program which was conducted by *Sulpetro Limited* on the MEL (26) zinc-lead-barite property, east of Watson Lake. Ten holes totalling 1 010 m were drilled on the newly discovered Jeri Zone.

Carmac Resources Ltd. optioned the MOM claims in the Wheaton River area (11). Old dumps of material previously mined by *Yukon Antimony Corporation Limited* on the claims carry antimony, silver and gold values. A preliminary reconnaissance soil geochemistry survey yielded anomalous gold and silver values.

Claymore Resources Ltd. located four silver-bearing veins on its S 126 claim group in the Rancheria area (27) following a geochemical survey. The company conducted a geochemical survey and trenching during the summer.

Hayes Resources Inc. completed excavation of 47 trenches on its gold property at Sonora Gulch, northwest of Carmacks (5).

Hudson Bay Exploration and Development Company Limited completed a 2 000 m diamond drilling program to test for disseminated gold mineralization in Tertiary ash flows on the south side of the Tintina Trench, at Grew Creek (14), west of Ross River.

International Prism Exploration Ltd. reported good intersections of silver-lead-zinc mineralization in its drilling program on the Big Red Zone on the VAL claims near Kathleen Lakes (19). Step-out drilling was also carried out on the adjoining VERA claims. A new zone, the G-D, was discovered to the northeast of the Vera adit. Trenching was carried out on the Siltstone Zone (VAL claims). As of September 1985, reserves on the Kathleen Lakes property amounted to 1.4 million t with grades of 308 g per t silver and six percent combined lead and zinc. The Big Red Zone is reported to have indicated potential in excess of 62 000 kg of silver.

Island Mining and Explorations Co. Ltd. conducted some preliminary work on its 187 claims northwest of Bennett Lake (11).

Exploration activity by *Kerr Addison Mines Limited* consisted of trenching and sampling on the Mount Cockfield area (5). Also Kerr Addison optioned four properties from *AGIP Canada Ltd.* in the Wheaton River (11) area. On the Mount Skukum claims in the latter area, gold-bearing quartz rich zones were located, sampled and mapped during 1985. Kerr Addison plans to drill in the Mount Skukum area during 1986.

Logan Mines Ltd. staked an additional 48 claims and conducted exploration on its ROY claim block (28) near the N.W.T. border. The polymetallic sulphide mineralization on its property containing gold, silver, lead and zinc values was extended.

Noranda Exploration Company, Limited conducted VLF-EM, magnetometer and IP surveys on Sanfred

Resources Ltd.'s TAM claims (11), on Mount Anderson, in the Wheaton River area. A soil sample survey showed anomalous lead, gold, zinc and silver values.

Northern Horizon Resources Corporation and *Everest Resources Ltd.* conducted geological mapping, geochemistry, trenching and drilling on its 24 TUF claims (d) located 128 km southwest of Whitehorse.

Omni Resources Inc. of Vancouver announced the discovery of a new narrow gold-bearing vein on its Skukum Creek property the southeast face of Mt. Reid, southeast of the Mount Skukum gold mine (11). The vein, from 0.15 m to about 1 m wide, yielded high gold assay values. The company drilled the Rainbow and Road zones on the property.

Pak-Man Resources Inc. and 2001 Resource Industries Ltd. trenched three silver-lead veins on the WOLF claims (27) in the Rancheria area. A small drill program of five holes failed to intersect mineralization.

In November, *Silver Hart Mines Ltd.* let a contract to drive a 207 m long adit on the MIDNIGHT (CMC) property (27) in the Rancheria area. The objective of the work is to establish reserves on the silver property. The results of a 50 hole diamond drilling program was compiled and potential ore was estimated at 187 700 t. The TM-FM zone has a strike length of 60 m and the SM Zone with a similar strike length is parallel to the TM-FM vein.

United Keno Hill Mines Limited conducted preliminary geochemical and geophysical surveys on the former Klondike Silver property (27) in the Rancheria area, near the B.C.-Yukon border. Basic prospecting on the LUCKY vein, followed by diamond drilling, gave encouraging results.

Westmount Resources Ltd. conducted a program of geological mapping and surface sampling on its Chieftain Hill property (11) in the Wheaton River area. Gold and silver mineralization occurs in the vicinity of felsic and intermediate dikes, which cut epiclastic volcanics.

Zinc-Lead-Silver

Canamax Resources Inc. completed 5 468 m of diamond drilling in 37 holes on its wholly owned Mount Hundere property (22) north of Watson Lake. The program successfully extended the previously established geological reserves on the Main and East zones by adding 1.76 million t grading 14.5 percent zinc, 8.5 percent lead and 55.98 g per t silver. Total geological reserves on the property at year-end stood at 2.2 million t grading 14.1 percent zinc, 8.7 percent lead and 72 g per t silver. The new reserves are in three overlapping flat-lying zones situated directly south of the Main and East zones. All new zones are open to extension.

Dawson Eldorado Mines Ltd. uncovered a zone of oxidation 365 m down slope from its high grade A showing on the KIWI prospect (29), 96 km north of Dawson. The new showing has yielded high zinc, lead and silver values.

Table 5
Exploration – Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	E. Linberg	Brokenshell River	Au
2	E Barnes	Borden Creek	Au
2	M. & P. Jones	Spruce Lake	Au
2	L. Shamanek	Clarke Lake	Au
3	Cominco	BUGOW	Au
3	Noranda	LEMON (Salmon Lake)	Au
3	Lightning/Terra	TT	Au
4	Blackridge	MQ-1 (Gordon Lake)	Au
4	Noranda	Beaulieu River	Au
4	Cruiser	MQ	Au
4	Giant Bay	MAHE (Gordon Lake)	Au
4	Goldrich/Treminco	TOM	Au
4	Halferdahl	PRO (Prosperous Lake)	Au
4	W. Humphries	Walsh Lake	Au
4	Ryan	WT	Au
4	Aber	AP	Au
4	Cove Energy	TANIA	Au
4	Equinox		Li
4	Tantalum Corp.	TCS, COVE	Ta
5	Terra	TA (Bullmoose Lake)	Au
5	Corolla	Consolation Lake	Au, W
5	Asamera	Clan, Sunset-Amacher lakes	Au
5	Noranda	Clan Lake	Au
5	Erex	BET	Li
5	Genesis	JOON	Au
5	J.S. Vincent	BIN, LENS, MUT	Ta, Sn
6	Giant Yellowknife	KA (Bridge Lake)	Au
7	Noranda	Indian Mountain Lake	Au
7	Asamera	Indian Mountain Lake	Au
8	Echo Bay	KIM	Au
8	Noranda	Indin Lake	Au
8	Aber	FUR, YUMS	Au
8	Comaplex	CHAL, EDE, CDC	Au
8	Delaware	CASS, DAVE	Au
8	Manson Creek	DAVE	Au
8	Golden Rule	Indin Lake	Au
8	Frontier	SANDRA, CATHY	Au
8	Placer	OTI, SPAN	Au
8	Suncor/Treasure Island	Spider Lake	Au
8	Suncor	Laurie Lake	Au
8	Suncor	Arseno Lake	Au
8	Cominco/Giant Yellowknife	BON	Au
9	Echo Bay	Itchen Lake	Au
9	Noranda	Point Lake – Itchen Lake	Au
9	Giant Yellowknife	TREE	Au
10	Gaint Yellowknife	ALGOOD (Regan Lake)	Au
10	Cominco	Back River	Au
10	Back River JV	Malley Rapids	Au
11	Back River JV	George Lake	Au
11	Echo Bay		Au
12	Echo Bay	HUNT, HEN	Au

Table 5 (continued)
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
13	Silver Hart	FARN, KNUT	Au
13	Aber	BLACKRIDGE	Au
14	Comaplex	Tehek Lake	Au
14	Comaplex	Whitehills Lake	Au
15	Echo Bay	Long Lake	Au
15	Comaplex	Judge Sissons Lake	Au
16	Aberford	Yathkyed Lake	Au
17	Suncor	Lothrop Lake	Au
17	Suncor	Mountain Lake	Au
18	Borealis	Ferguson River	Au
19	Canadian Nickel	Whale Cove	Au
20	Borealis	Melville Pen.	Au
21	Panarctic	Minto Arch	Cu, Ag
22	Petro-Canada	Elwin Inlet	Ag, Ba, Pb
23	Petro-Canada	Baffin Island	Pb, Zn
24	Enexco	Rutledge Lake	Ni, Cu
25	Highwood	Blanchet Island	Co, Ni
26	Pine Point	JMBS	Pb, Zn
27	Asamera	Prairie Creek	Ag, Pb, Zn
28	Logan	ROY	Pb, Zn, Ag, Au
29	Urangesellschaft	LONE GULL	U
30	PNC Exploration	Marjorie Lake	U
31	PNC Exploration	DVB	U
32	PNC Exploration	Dunkel Lake	U
33	PNC Exploration	Salkeld Lake	U
34	CEGB Exploration	Dumas Lake	U
35	Amax	MACTUNG	U
36	Selco		Diamonds
37	Selco	Keele River	Diamonds
38	Selco		Diamonds
39	Highwood	Thor Lake	REE, Be
40	Canuc/Echo Bay	ARCADIA	Au
b	Pine Point	Pine Point	Pb, Zn
c	Asamera	Yellowknife	Au
c	Giant Yellowknife	Crestaurum Mine	Au
c	Golden Marlin	MARLIN	Au
c	Cominco	Niven Lake	Au
e	Noranda	FAT, BERTHA	Au
e	Cominco/Giant Yellowknife	Courageous Lake	Au
e	Placer	Courageous Lake	Au
f	Nanisivik	NANISIVIK	Pb, Zn
g	Cominco/Cogema	Contwoyto Lake	Au
g	Aber/Bow Valley	FIN	Au
g	Bow Valley	Contwoyto Lake	Au
g	Brinco	WEST	Au
g	Hecla	JOHN, SHIN, DLER	Au
g	Argonaut	WHY	Au
g	Hidden Lake	GOLD	Au
i	Cominco	POLARIS	Pb, Zn

Table 6
Exploration - Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	Klondike Underground	Miller Creek	Placer Au
1	Noranda	LGC	Au
2	White Channel	Jackson Hill	Placer Au
3	King Solomon	King Solomon	Placer Au
3	Dawson Eldorado	Lone Star	Au
4	Nordac/Permian/Casino Silver	Casino	Au
4	Archer, Cathro/Chevron	Idaho Creek	Au
5	Archer, Cathro/Chevron	SELWYN	Au
5	Kerr Addison	Mount Cockfield	Au
5	Archer, Cathro/Chevron	NIT	Au
5	Hayes	Sonora Gulch	Au
6	Nordac	CASH	Au, Ag, Zn, Pb
6	Archer, Cathro/Chevron	NUCLEUS	Au
6	Nordac/Yukon Revenue	REVENUE	Au, Cu, W
6	Nordac/Permian	Rambler Hill	Au
6	Archer, Cathro/Chevron	ZIT	Au
6	Yukon Revenue	GOLDY	Au, Ag, Pb, Zn
7	Chevron/B.Y.G./Archer, Cathro	Mount Nansen	Au
7	Chevron/B.Y.G./Archer, Cathro	Brown-McDade	Au
8	Archer, Cathro/Chevron	MALONEY	Au
9	Noranda	Wade Creek	Au
10	Noranda	FACE	Au
10	Rockridge	BOTWAT	Au
11	Erickson/AGIP	Mount Skukum	Au
11	Barker Creek	FOUR F	Au, Zn, Pb
11	Barker Creek	NEW	Au, Ag
11	Tally-Ho/Euro/Permian	GOLD HILL	Au
11	Shakwak	CHARLIE	Au
11	Shakwak/AGIP	BEAR	Au
11	Island Mining		Au
11	Westmount	Chieftian Hill	Au, Ag
11	Kerr Addison/AGIP	Mount Skukum	Au
11	Carmac	MOM	Ag, Au, Sb
11	Tally-Ho	TALLY-HO	Au
11	Tally-Ho/Euro/Permian	Mount Wheaton	Au
11	Barker Creek	ERA	Au, Ag
11	Noranda	ILLIA, RYE	Au
11	Tally-Ho/Euro/Permian	Mount Stevens	Au
11	Shakwak/AGIP	ODD	Au
11	Noranda/Sanfred	Mount Anderson	Au, Ag, Pb
12	Shakwak	CHARLESTON	Au
12	Noranda	SCAR	Au, Ag, Sb
13	Shakwak	MONTANA	Au
14	Hudson Bay	Grew Creek	Au
15	Canamax	Ketza River	Au
15	Canamax	STUMP, HOEY	Ag, Pb
15	Ketza/Canamax/Pacific		
	Trans-Ocean	BOOM, KON, OXO	Au
16	Shakwak	SOURCE	Ag, Pb
17	United Keno Hill	HOLLIDAY	Ag, Pb, Zn
18	Kidd Creek	CUZ	Au

Table 6 (continued)
Exploration – Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
19	Canadian Nickel	BLENDE	Zn, Pb
19	International Prism	VAL	Ag, Pb, Zn
20	Cominco	NIDD	Pb, Zn, Ag
21	Comox	BAR	Pb, Zn
22	Canamax	HUNDERE	Zn, Pb, Ag
23	Canamax	HOT	W, Mo
24	Cominco	TAY	Pb, Zn
25	Yukon Barite	PETE, TEA	Ba
26	BP Canada	MEL	Zn, Pb, Ba
27	Claymore	S126	Ag, Pb
27	Pak-Man/2001 Resource	WOLF	Ag, Pb
27	Silver Hart	MIDNIGHT, CMC	Ag
27	United Keno Hill	LUCKY	Ag
28	Logan	ROY	Au, Ag, Bb, Ba
29	Dawson Eldorado	KIWI	Zn, Pb, Ag
a	United Keno Hill	Keno Hill	Ag
b	Curragh	Faro	Pb, Zn, Ag
d	Everest/Horizon KANE,	TUF	Ag, Pb, Zn

Footnotes for Tables 5 and 6

(1) Table location is made with reference to corresponding numbers on Yukon and Northwest Territories maps. Locations are approximate.

(2) Abbreviated name of the Company is used: Expl. (Exploration), Ltd./Lteé (Limited), JV (Joint Venture).

(3) Geographical areas are indicated by small print, whereas claims and groups are capitalized. Abbreviated words are: Peninsula (Pen), River (R), Lake (L).

(4) Metal(s) of primary importance defined by chemical symbols: copper (Cu), gold (Au), lead (Pb), tantalum (Ta), lithium (Li), asbestos (Asb), molybdenum (Mo), silver (Ag), barium (Ba), cobalt (Co), tin (Sn), iron (Fe), tungsten (W), niobium (Nb), beryllium (Be), rare earth elements (REE), mercury (Hg), antimony (Sb) and uranium (U).

Organizational Structure and Mandate

As of December 1986, the Minister and departmental officers responsible for the administration of mines and mineral resources in the Northwest Territories and the Yukon were:

Minister:	Bill McKnight
Deputy Minister:	B. Rawson
Associate Deputy Minister: (Northern Affairs):	J. Gerin
Director General, Northern Resources and Economic Development:	D. Wetherup
Director, Mining Management and Infrastructure:	Dr. J. Lazarovich
Chief, Mining Administration:	J.M. Hodgkinson
Acting Head, Mining Resources Section: Evaluation Geologist: Technical Information Officer:	T.W. Caine vacant P.T. Marion
Head, Mining Lands Section:	T.W. Dent
Head, Legislation:	P.M. Corrigan
Head, Royalties:	L.I. Alberti
Chief, Mineral Policy:	L. Guptill
Chief, Infrastructure:	W.G. Cleghorn

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Placer Geologist:	S. Morrison
Staff Geologists:	D. Emond W. LeBarge T. Bremner
Map Sales and Core Librarian	R. McIntyre
Regional Manager, Mineral Rights: Mining Recorders:	B.R. Baxter M.A. Fish, Whitehorse R.H. Whittingham, Dawson R.G. Ronaghan, Mayo Y. Burkhard, Watson Lake
Regional Mining Engineer:	C.H. Macdonald
District Mining Engineer:	N. Prasad
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Staff Geologist:	J.C. Crux
Archive Geologist:	V.A. Jackson
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Department of Indian Affairs and Northern Development

The Department of Indian Affairs and Northern Development (DIAND) is responsible for the administration of all mines and mineral activities in the Yukon and Northwest Territories. DIAND, as part of the federal government, administers the policy and legislative instruments which govern the mining industry in both territories.

Within DIAND's Northern Affairs Program, major functional groups, which deal directly with the mining industry, are the Northern Resources and Economic Planning Branch and the Northern Environment Branch at Headquarters, and the Regional Northern Affairs Program Branches in the Yukon Region and Northwest Territories Region.

The Northern Resources and Economic Planning Branch at Headquarters consist of three directorates: Northern Economic Planning, Oil and Gas Management and Major Projects, and Mining Management and Infrastructure. This branch is accountable for the development of departmental strategies, policies, legislation, plans and programs related to northern economic development, including the development and management of non-renewable resources and northern economic infrastructure. In addition, the Branch has a headquarter's function in the co-ordination of federal and territorial activities in the area of northern economic resource development and departmental policies and mechanisms to provide socio-economic development and benefits.

In 1982, the Northern Resources and Economic Planning Branch underwent a re-organization which resulted in the establishment of the Mining Management and Infrastructure Directorate, integrating the Transportation and Communications Division, Northern Roads and Airstrips Division, Non-Renewable Resources Development Division and the Mining Division. The Mining Management and Infrastructure Directorate brings the mining and infrastructure elements of the Northern Program together to give co-ordination on issues related to mineral policy, mineral resources, mining industry development, mining legislation and infrastructure support.

The Mining Management and Infrastructure Directorate develops and administers federal northern mineral policy and legislation, assesses infrastructure requirements of existing and potential resource oper-

ations requiring roads, airstrips and other transportation modes, and administers mining and mineral rights. The Directorate consists of the Mining Administration Division, the Mineral Policy Division and the Infrastructure Division.

Mining Administration Division

The Mining Administration Division develops policy related to the regulation of the Northern mineral industry, which includes providing for the consultative process with industry and initiating and drafting of appropriate acts, regulations and policy documents related to the disposition and to the administration of mineral rights in the Yukon Territory and Northwest Territories. The Division administers the royalty provisions of the *Yukon Quartz Mining Act*, *Canada Mining Regulations* and *Territorial Coal Regulations*. The Division advises and negotiates with various government agencies whose responsibilities interface with mining in the Territories, provides information on current and proposed exploration and mining developments and maintains a microfiche library of assessment reports, geological reports and other mineral resource information.

Mineral Policy Division

The Mineral Policy Division develops policies and plans to promote the orderly management and development of mineral resources in the Yukon and Northwest Territories. In support of these activities, it conducts studies and investigations of the economic aspects of mineral industry operations. Similar studies and investigations are also carried out to assess proposed major new mine developments in the Territories and to monitor existing operations. A major activity of the Division, together with Mining Administration Division and Infrastructure Division, at present, is the development of a northern mineral policy to guide mineral development in the Territories over the next decade. Although only the preliminary phases of policy development have been completed, the Minister has stated that he would like to address such issues as the role of mining in the northern economy, the involvement of native people, the provision of infrastructure, the creation of a favourable investment climate through the maintenance of an appropriate fiscal and regulatory regime and the establishment of an appropriate balance between people, minerals and the environment.

Infrastructure Division

The Infrastructure Division is responsible for policy, assessing, planning, programming and funding of infrastructure requirements in the North including roads, airstrips and other transportation modes within the general framework of northern development strategies, policies, plans and programs for northern economic development. The Division provides overall management for the Northern Roads Program. In addition, it manages the Northern Resource Roads Program under which the Department enters cost sharing agreements with industry for the construction of initial and permanent access roads.

Regional Offices – Yukon and Northwest Territories

The Yukon Region Branch and Northwest Territories Region Branch of the Northern Affairs Program are major functional groups, which under the direction of regional Directors General, administer the mandate of the Program and the provisions of mining legislation and regulations within the respective Territories. Offices are located at Whitehorse, Y.T. and Yellowknife, N.W.T.

The Regional Branches have the following subunits: Mining Lands Section, Geological Services Sections and a Mining Inspection Section (in the Yukon only).

Mining Lands Sections

The Mining Lands Section in the Yukon and Northwest Territories administrative offices have been divided into seven mining districts. A mining recording staff is responsible for the disposition of mineral rights within each district in accordance with applicable legislation. There is a Supervising Mining Recorder in each territory, whose principal function is to ensure that the regulatory requirements are followed in the administration of the various mining acts and regulations.

Geological Services Sections

Geological Services Sections publish geological reports and maps and provide geological services to the mineral industry in both Territories. Offices are maintained at Whitehorse and Yellowknife. Two core libraries, the H.S. Bostock Library in Whitehorse and the C.S. Lord Library in Yellowknife preserve diamond drill core.

Each core library has laboratory facilities for core splitting, diamond-saw cutting, thin section preparation and core storage. Regional and district geologists conduct mineral property examinations, collect rock and mineral specimens and advise the mineral industry, government departments and research scientists on geological and exploration matters. Department geologists assist prospectors in identifying rock and mineral specimens, by conducting prospector training courses and preparing geological compilation maps on mineralized areas.

Mining Inspection Section

In the Yukon, the Mining Inspection Section gives advice on the *Mining Safety Ordinance* and *Mine Safety Regulations* of the Yukon Territory as well as the *Blasting Ordinance and Regulations of the Yukon Territory*.

It also prepares new safety legislation when required. A regional mining engineer is stationed at Whitehorse. This senior mining engineer has a staff consisting of a district engineer, an electrical-mechanical engineer, an environmental engineer, a mine rescue superintendent, three claim inspectors and a clerk.

The Section is responsible for the following: inspection of mines, quarries and blasting operations to ensure compliance with safety legislation; inspection of mineral claims to ensure compliance with the *Yukon Quartz Mining Act* and the *Yukon Placer Mining Act*; ensuring that sufficient mine personnel are trained in mine rescue, recovery operations and first aid; conducting ventilation and dust surveys; monitoring radioactive contamination, and carrying out environmental studies at underground and surface mining properties.

Table 7, Mineral Production - 1976-1985

Yukon Territory - Yukon		1976	1977	1978	1979	1980	1981	1982	1983	1984(R)	1985(P)
Mineral											
Gold	\$	4 401 075	4 656 118	8 518 731	13 749 271	63 029 000	66 382 000	39 721 000	50 337 000	44 419 000	43 098 000
g		1 111 949	921 907	1 202 149	1 190 268	2 982 000	3 746 000	2 656 000	3 006 000	2 960 000	3 098 000
Silver	\$	12 809 321	20 154 760	28 462 559	54 218 064	114 120 000	32 339 000	29 943 000	6 891 000	18 825 000	12 675 000
g		92 697 630	127 415 268	143 459 000	129 982 000	147 000 000	80 000 000	95 000 000	15 000 000	54 000 000	45 000 000
Lead	\$	15 990 040	47 627 667	64 322 403	103 374 279	71 558 000	54 935 000	25 733 000	307 000	1 539 000	877 000
kg		32 035 681	68 621 899	79 233 298	78 250 062	65 771 000	55 970 000	35 493 000	520 000	2 083 000	1 520 000
Copper	\$	16 045 963	8 953 814	16 474 354	18 422 058	27 082 000	20 123 000	14 654 000	3 977 000		
kg		10 642 540	5 843 210	10 018 826	7 778 231	10 433 000	9 094 000	7 510 000	1 904 000		
Zinc	\$	39 233 926	80 562 287	74 076 827	109 460 866	88 313 000	94 237 000	58 519 000	31 000	244 000	41 000
kg		47 300 153	102 846 637	96 673 141	113 572 783	90 938 000	78 806 000	54 537 000	27 000	173 000	32 000
Bismuth	\$									2 000	10 000
kg										162	1 000
Cadmium	\$	13 220	11 595	355					6 000	9 000	9 000
kg		2 284	1 670	58					2 000	2 000	3 000
Asbestos	\$	35 310 723	47 493 872	26 948 800							
tonnes		103 431	95 590	53 255							
Sand and Gravel	\$							550 000	1 438 000	5 105 000	1 225 000
t								463 000	480 000	3 074 000	700 000
Coal (E)	\$	189 000	322 000	318 000	363 000	287 000	368 000				
tonnes		9 046	18 779	16 578	23 003	16 529	20 860				
Total	\$123 813 268	209 460 113	218 804 029	299 244 538	364 389 000	268 016 000	62 987 000	70 143 000	57 935 000		

Source: Mineral Policy Sector, Energy, Mines and Resources and Northern Resources and Economic Planning, Indian Affairs and Northern Development.
(P) Preliminary Figures, (R) Revised Figures, (E) estimated.

Table 8, Mineral Production – 1976-1985

Northwest Territories		1976	1977	1978	1979	1980	1981	1982	1983	1984(P)	1985(P)
Mineral											
Gold		\$ 24 390 081	31 336 428	45 769 718	61 888 488	96 920 000	85 495 000	91 415 000	144 570 000	191 071 000	180 585 000
g		6 162 252	6 204 583	6 458 948	5 355 926	4 209 000	4 825 000	6 113 000	8 634 000	12 732 000	12 981 000
Silver		\$ 14 342 774	18 716 934	23 854 173	34 770 651	41 331 000	13 465 000	16 073 000	33 743 000	20 361 000	9 615 000
g		103 794 822	118 325 557	120 237 000	83 358 000	53 000 000	33 000 000	51 000 000	74 000 000	59 000 000	34 000 000
Copper		\$ 639 980	445 850	518 993	941 732	679 000	613 000	419 000	214 000	130 000	
kg		424 649	291 959	315 624	397 191	262 000	277 000	215 000	102 000	69 000	
Lead		\$ 26 440 157	40 833 313	56 898 673	80 117 935	55 853 000	44 680 000	46 367 000	47 901 000	66 647 000	44 805 000
kg		52 942 453	58 832 599	70 088 814	60 645 969	51 337 000	45 522 000	63 955 000	81 161 000	90 198 000	77 631 000
Zinc		\$122 438 035	125 104 245	143 911 352	205 600 051	172 556 000	159 764 000	229 110 000	269 951 000	386 813 000	341 923 000
kg		147 610 457	159 709 355	187 809 913	213 323 454	175 685 000	133 604 000	213 523 000	234 883 000	274 920 000	269 655 000
Cadmium		\$ 3 179	2 677						10 000	1 034 000	758 000
kg		549	386						3 000	214 000	209 000
Bismuth		\$							163 000	34 000	68 000
kg									32 000	3 000	4 000
Tungsten Trioxide		\$ 24 435 000	41 516 000	47 310 800	52 924 000	67 646 000	43 263 000	38 353 000	11 221 000	33 584 000	38 598 000
kg		2 168 154	2 284 409	2 885 619	3 254 067	4 007 000	2 515 000	2 925 00	1 126 000	3 112 000	3 500 000
Arsenic Trioxide (E)		\$					561 000	3 862 000	2 345 000	5 837 000	1 696 000
t							1 094	1 780	982	4 684	4 098
Sand and Gravel		\$						41 482 000	32 479 000	36 323 000	33 350 000
t								6 625 000	5 905 000	7 249 000	6 750 000
Stone		\$						1 268 000	14 601 000	4 617 000	795 000
t								323 000	2 409 000	729 000	127 000
Total		\$212 690 206	257 955 447	318 262 909	436 222 857	434 985 000	347 841 000	468 349 000	557 198 000	746 451 000	652 193 000

Source: Mineral Policy Sector, Energy, Mines and Resources and Northern Resources and Economic Planning, Indian Affairs and Northern Development.
(P) Preliminary Figures, (R) Revised Figures, (E) estimated.



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Northern Affairs Program

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Introduction

This report covers mines and mineral activities for the Yukon and Northwest Territories for the calendar year 1986.

The report was written and compiled by D.D. Brown and T.W. Caine of the Mining Resources Section, Ottawa. Sections on mineral exploration are based on exploration overviews produced by regional geological staff under the direction of J.A. Morin in the Yukon and W.A. Padgham in the Northwest Territories.

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Executive Summary

Yukon

Mineral production in the Yukon in 1986 was derived from three mines that operated year-round, four small mines that operated seasonally and some 190 seasonal placer gold operations. The year 1986 was marked by a number of important events that brought significant economic recovery to the Yukon's mineral industry. The largest mine in the territory, the Faro zinc-lead-silver mine, returned to production through a new owner Curragh Resources. The gold industry moved ahead with the start-up of the Mount Skukum gold mine and production from Yukon placer mining operations were at the highest level since 1950. Finally, United Keno Hill Mines significantly stepped up its production of silver.

The value of the Yukon's production shipments of minerals more than tripled from \$60.1 million in 1985 to \$183.5 million in 1986.

Mineral exploration in 1986 was largely directed to precious metals including a number of projects that involved extensive drilling and underground development. The most advanced and promising development project is the Ketzia River gold project of Canamax Resources Inc. and Pacific Trans-Ocean Resources Ltd.

Northwest Territories

Mineral production in the NWT in 1986 was derived from eight mines, including four gold mines, three zinc-lead-(silver) mines and one tungsten mine. During the year, Canada Tungsten closed its Cantung Mine because of low tungsten prices.

The value of the NWT's production shipments of minerals was \$656 million in 1986 compared with \$649 million a year earlier. While gold prices increased, lower zinc, silver and tungsten prices tended to offset gains made in the value of mineral production. Because of a planned production increase, the combined output of zinc and lead concentrate at the Pine Point Mine reached 563 900 t, a 60 per cent increase in terms of contained metal. However, the Pine Point Mine is scheduled to cease operations at the end of 1987 because of ore-reserve depletion.

In 1986, mineral exploration in the NWT was largely directed to gold projects, including a number of properties that involved extensive drilling and

underground development. Among the leading projects is the Noranda Exploration Company and Getty Resources joint venture on the Tundra project, northeast of Yellowknife. Some 1.1 million t of ore-grade material has been outlined by drilling on the Fat (Main) gold zone on the Tundra property. Also, Aber Resources reported encouraging gold assays from drill intersection in the Indin Lake area, north of Yellowknife. While no large-scale mine was scheduled for pre-production development in the NWT at 1986 year-end, Treminco Resources plans to reopen the small Ptarmigan gold mine near Yellowknife and start mine production in 1987. As exploration advances in 1987 other production decisions may be made.

Mines and Mineral Activities

Yukon

Mineral Production

Yukon's mineral production was derived from three permanent hard rock mines, four small seasonal open-pit mines and approximately 190 seasonal placer gold operations.

The value of Yukon's production shipments of minerals more than tripled in calendar year 1986 to reach \$183.5 million, from \$60.1 million in 1985. The year 1986 was marked by two important events, the return to production of the Faro Mine through a new owner, Curragh Resources Corp., and new gold production from the Mount Skukum Mine. An estimated \$91 million of the production value in 1986 is attributable to production from Curragh Resource's Faro zinc-lead-silver mine. The Faro mill commenced production in mid-year following a four-year shutdown. Higher gold prices in 1986, the start up of Total Erickson Resources Ltd.'s Mount Skukum gold mine and record gold production from placer operations together resulted in a four per cent increase in the value of gold shipments from the previous year. In spite of lower silver prices in 1986 compared with the previous year, the value of silver shipments increased because of significantly higher silver output at the United Keno Hill Mine and new by-product silver production from the Faro Mine.

Small seasonal open-pit mining operations also contributed to Yukon's mineral output. Dawson Eldorado Mines Ltd. mined silver-lead ore in the Hess River and Keno Hill areas, Nadihini Mining Corporation mined thermal coal near Ross River and Whitehorse Coal Corp. mined thermal coal near Whitehorse.

Gold exploration, supported in large measure by flow-through shares funding, was the driving force in mineral exploration and development activity. The success of the new Mount Skukum gold mine, the Yukon's first significant lode gold mine and the steadily increasing reserves at Canamax Resource's Ketza River gold property, under development, signalled renewed growth in the territory's mining industry. Other exploration and development activities directed to silver continued in the expectation of higher silver prices.

Table 1
Mineral Production of Operating Mines in the Yukon Territory, 1985 and 1986.

Company, Mine and Commodity	1985		1986	
	t	kg	t	kg
<i>Curragh Resources Corp.</i>				
Faro Mine				
zinc	-		62 951	
lead	-		38 204	
silver		-		42 753
<i>Dawson Eldorado Mines Ltd.</i>				
Plata-Inca				
silver		9 330		1 244
lead	1 360		N.A.	
<i>Nadahini Mining Corporation</i>				
Whiskey Lake				
coal	-		17 233	
<i>Total Erickson Resources Ltd.</i>				
Mount Skukum				
gold	-			933
silver	-			715
<i>United Keno Hill Mines Ltd.</i>				
Elsa area mines				
silver		39 585		53 187
lead	975		1 355	
zinc	-		66	
<i>Whitehorse Coal Corporation</i>				
coal	-		1 800	

Source:

Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and may not match Statistics Canada's production figures which are based on metals sold or shipped.

- : Nil

N.A.: Not Available

The Yukon's lode (hard rock) mining industry employed directly 799 persons at 1986 year-end compared with 239 persons one year earlier. In addition, the Yukon placer mining industry employed in estimated 600 to 700 persons at approximately 190 placer operations on a seasonal basis.

The Yukon accounted for 12 per cent of the lead, 5.2 per cent of the zinc, 3.8 per cent of the gold and 5.4 per cent of the silver produced in Canada during 1986. Also the Yukon accounted for 2.0 per cent of the value of Canada's metallic mineral production in 1986 compared with 0.7 per cent in 1985.

Mines

Curragh Resources Corp., Faro Mine

In November 1985, Curragh Resources acquired the Faro Mine (b) and other mine assets in the nearby Vangorda Plateau area from Cyprus Anvil Mining Corporation. Reopening activities included overburden stripping, which commenced in January 1986, and the start-up of the Faro mill in June 1986. Most of the ore production from June to year-end was from peripheral ore zones of the Faro pit and from previously stockpiled oxidized ore. Higher grades of ore from the Faro pit will be mined in 1987.

During 1986, 1.94 million t of ore grading 3.0 per cent lead, 4.7 per cent zinc and 41.6 g per t silver were produced. Mill production amounted to 66 213 t of lead concentrate and 132 966 t of zinc concentrate containing 38 204 t of lead and 62 951 t of zinc respectively and 42 753 kg of silver. In the final quarter of the year, Curragh's Faro mill was processing ore at an average rate of 12 000 t per day.

Curragh's operation involves the use of 40 special purpose B-train truck and trailer units to haul concentrate 550 km from Faro to the port of Skagway, Alaska.

Curragh's existing Faro Mine contains sufficient reserves to feed the Faro mill for an additional six years, but peak concentrate production is scheduled to decrease after 1988. Hence the company is planning to develop a supplemental ore supply from its zinc-lead-silver deposits in the Vangorda Plateau area, some 16 km east of the Faro mill. The Vangorda and Grum deposits in this area have a sufficient tonnage of open-pit ore for seven to 10 years of mine production.

Type:	Open pit
Location:	13 km north of Faro
Product:	zinc, lead, silver
Mill Capacity:	1 350 tpd
Tonnes Milled:	1 943 436
Reserves:	21.4 million t in the Faro Pit (Dec. 31, 1986)
Reserve Grade:	4.3 % zinc, 2.8 % lead, 35 g/t silver
Employees:	530 including 470 contractor employees

Total Erickson Resources Ltd., Mount Skukum Mine

Total Erickson Resources Ltd. under a joint venture agreement with AGIP Canada Ltd. is the operator of the Mt. Skukum gold mine (d) through its wholly-owned subsidiary, Mt. Skukum Gold Mining Corporation. Following mine development activities in 1985, the 270-tpd mill was tuned up for initial production in February, 1986 and the first dore bar was poured on March 7, 1986. From start-up to 1986 year-end, the mill processed 77 655 t of ore to produce 933.2 kg of gold and 715 kg of silver. All ore production was from the Cirque zone where reserves at the beginning of the year amounted to 164 000 t grading 20.5 g per t of gold. During the year, drilling of the nearby Brandy and Lake zones outlined 91 900 t of new reserves grading 14.9 g per t.

Type:	Underground
Location:	90 km south west of Whitehorse
Product:	Gold, silver
Mill Capacity:	270 tpd
Tonnes Milled:	77 655 t
Reserves:	205 797 (Oct. 31, 1986)
Reserve Grades:	11.6 g/t gold
Employees:	82

United Keno Hill Mines Limited, Elsa Area Mines

In 1986, United Keno Hill Mines Limited extracted silver ore from four underground mines in production, three underground mines under development and three open-pit mines. Together, the 10 mines supplied 73 572 t to United Keno's central mill (a) and an additional 123 t of high-grade ore was shipped directly to Cominco's smelter at Trail, B.C. Mill production amounted to 4 860 t of concentrate containing 53 187 kg of silver, 1 355 t of lead and 66 t of zinc.

*Numbers or letters in parentheses indicate the location of the property on the map.

The company continued its multi-million dollar on-property exploration and underground development program that started in 1984. The program will continue in 1987 to completely outline three high-grade silver zones that have been intersected by drilling and underground development.

Type:	Underground and open pit
Location:	Keno Hill-Galena Hill area, near Elsa
Product:	Silver, lead, zinc
Tonnes Milled:	73 572 t
Reserves:	172 909 t (Dec. 31, 1986)
Reserve Grade:	864.7 g/t silver, 4.3 % lead
Employees:	187

Small Seasonal Mine Operations

Dawson Eldorado Mines Ltd., Plata-Inca and Caribou Properties

The company mined some 200 t of direct-shipping silver-lead ore containing 1 244 kg of silver from the surface of the Plata-Inca (c) property during August and the first two weeks of September, 1986. The ore contained from 2 572 g per t to 12 862 g per t of silver and averaged approximately 6 000 g per t of silver. Since 1983, the company has mined the property during the summer months and has transported the ore by air to Ross River for transshipment by truck to Cominco's smelter at Trail, B.C.

The company also mined 91 t of silver-lead ore on the Caribou lease on Keno Hill (a) during the autumn of 1986. The average grade of direct shipping ore was approximately 13 700 g per t of silver. The Plata-Inca operation employed 10 persons and the Caribou operation employed 5 persons.

Nadahini Mining Corporation, Whiskey Lake Property

The company mined the small open-pit Whiskey Lake coal property west of Ross River (e), under an agreement with Curragh Resources Corp. to provide thermal coal for Curragh's mill operation at the Faro Mine. During the spring/summer operating period, the company mined 17 233 t of high-carbon, low-ash, non-coking, bituminous coal for shipment by truck to Faro. The coal seams consist of two parallel, vertically-dipping beds, some 2 m thick, and separated by 20 m of rock. The property has some 300 000 t of mineable reserves and the operation employed four persons.

Whitehorse Coal Corporation Ltd.

The company mined 1 800 t of thermal coal from its leases, 20 km southwest of Whitehorse (f), for the purpose of demonstrating mining feasibility and local-marketing feasibility. The work was funded by territorial government's Yukon Energy Alternatives Program.

Placer Mining

In 1986, the Yukon's placer mining industry attained its highest gold production record since 1950. Production of gold determined by royalty payments increased to 3 223 kg of raw gold compared with 3 098 kg of raw gold in 1985. The 1986 raw gold production is estimated to contain 2 878 kg of fine or pure gold.

In 1986, there were approximately 190 placer operations and 94 per cent of the placer gold production was produced on 25 creeks. Half of these creeks are in the Klondike (1) area and one-sixth are in the Sixty Mile (2) area. Other important placer areas are the Mayo/McQueston (3), Stewart River (5), Clear Creek (4), Livingstone Creek (6), Carmacks (7) and Kluane areas (8). Most of the placer gold produced was from small seasonal (spring to fall) operations that use heavy earth-moving equipment and sluice boxes.

Only one dredge was in operation. Queenstake Resources continued operating its dredge on Clear Creek (4) and its sluice operations on Maisy May Creek and Black Hills Creek.

Two underground placer mines were worked during the fall and winter months of 1985-1986. White Channel Underground Mining Ltd. mined 23 000 cubic m of gravel at the Jackson Hill Mine on the Klondike River (1) and recorded production of 93 kg of gold. Klondike Underground Mining Ltd. mined 31 000 cubic m of gravel from underground on Miller Creek (2), in the Sixty Mile River area and recovered 16 kg of gold.

The Indian River in the Klondike area (1) saw a high level of mining activity with about 10 moderate-to large-sized placer operations.

In 1986, 1 689 placer claims were staked, compared with 1 103 in 1985. At the close of 1986, there were 14 701 placer claim dispositions in good standing, compared with 14 493 in 1985. There were also 225 placer leases to prospect in good standing compared with 240 in 1985. Also there were nine dredging leases in good standing compared with six a year earlier.

Development

The following properties had significant underground development: the Ketz River (BOOM) gold property in the Ross River area; the Silver Hart (MIDNIGHT) and A.M.P. Explorations LOGJAM (BARB) silver properties in the Rancheria area and United Keno Hill's silver properties in the Elsa area.

Canamax Resources Inc. and Pacific Trans-Ocean Resources Ltd. continued a major exploration/development program on the Ketz River gold property (9), 80 km south of Ross River. Work during the year included driving two adits and several raises for approximately 1 220 m of lateral and vertical development to explore the high-grade Ridge and Peel zones. Also 4 289 m of surface diamond drilling and 709 m of underground drilling resulted in an increase in the grade and tonnage of the zones. Early in 1987, the company announced that reserves in the two zones amounted to 460 000 t of oxide ore grading 15.4 g per t of gold. In addition, reserves in the Break zone amounted to 75 000 t grading 13.9 g per t of gold. A feasibility study was initiated at year-end in anticipation of a production decision in 1987.

A.M.P. Explorations and Mining Co. Ltd. conducted a program of lateral development of an adit and underground diamond drilling on the LOGJAM silver property (10), in the Rancheria area. The work, conducted during September and October, was directed to exploring the No. 4 and No. 6 veins.

Silver Hart Mines Ltd. completed 231 m of underground development by driving an adit and several raises on the MIDNIGHT (CMC) silver-lead-zinc property (11) in the Rancheria area. A program of surface trenching intermittently over a strike length of 1 160 m exposed silver-lead-zinc mineralization in the main fault that contains the TM, SM and KL zones.

United Keno Hill Mines Ltd.'s development program in the Elsa area (a) was concentrated on continuation of the underground programs at the Silver King, Bellekeno and Lucky Queen mines. Drifting and raising amounted to 1 270 m. At the Bellekeno mine, 18 underground holes totalling 1 151 m were drilled into a significant high-grade ore shoot. In 1987, several silver ore zones will be explored further by development work.

Mineral Exploration

Mineral exploration and pre-production development expenditures in the Yukon were estimated at approximately \$29 million in 1986 compared with \$22.7 million a year earlier. Gold was the major target of exploration programs in the Dawson Range (12), Mount Skukum-Wheaton River area (d), Montana Mountain area (17) and southeastern Pelly Mountain area (9). The Rancheria area (10) saw continuing exploration activity for silver-lead deposits. Also, higher prices for platinum group metals stimulated exploration activity in the Kluane area (8).

Quartz claims (hard rock claims) in good standing at 1986 year-end amounted to 46 051 compared with 46 301 at year-end 1985. During 1986, 6 016 new claims were staked and 20 coal leases, 14 701 placer claims, 225 placer leases and 9 dredging leases were in good standing.

Table 2
Quartz Claims Recorded in Yukon, 1985 and 1986

Mining District	Claims Recorded	Claims Recorded
	1986	1985
Whitehorse	2 494	4 035
Dawson	568	386
Mayo	310	75
Watson Lake	2 644	1 323
Total	6 016	5 819

Exploration Projects

Gold-(Silver)

As in previous years, the Dawson Range northwest of Whitehorse was host to much of the gold exploration activity. The work in the Freegold Mountain, Revenue Creek, Mount Nansen, Casino and Mount Cockfield areas was directed to targets associated with Cretaceous volcanic rocks and related felsic intrusions. In the Mount Skukum-Wheaton River area and the Montana Mountain area, south of Whithorse, exploration was directed to mineralization associated with Late Cretaceous and Tertiary volcanic rocks.

Chevron Canada Resources Limited uncovered gold-silver mineralization on the Brown-McDade property (12) which was optioned from B.Y.G. Natural Resources Inc. Chevron traced the new Flex zone (consisting of two sets of sub-parallel veins over 300 m) by trenching. Sampling of the zone yielded assays grading up to 3.54 g per t of gold and 60 g per t of silver over 11 m.

Nordac Mining Corporation and Permian Resources Ltd. completed 24 diamond drill holes totalling 2 189 m on the ANTONIUK (GUDER) property (7), near Revenue Creek. The property was optioned from Discovery Mines Ltd. and has potential for open-pit mining and heap leaching. Drill indicated mineralization amounts to 3.72 million t averaging 1.14 g per t of gold at a cutoff grade of 0.5 g per t and with a waste to ore ratio of 0.85 to 1. Nordac also explored the REVENUE (7) property, located 13 km northwest of the ANTONIUK property, under an option agreement with Yukon Revenue Mines Ltd.

Silverquest Resources Ltd. explored the NIT property (13), optioned from Chevron Canada Resources Ltd. Trenching and chip sampling returned one assay of 96.7 g per t of silver and 0.5 g per t of gold over 15 m. Silverquest also conducted a soil sampling and trenching program on the IDAHO CREEK property (14), which was also optioned from Chevron Canada Resources.

In the Dawson area, Arbor Resources Inc. completed 10 diamond drill holes on the LONE STAR gold property (5), which was optioned from Dawson Eldorado Mines Ltd. The drilling intersected gold mineralization in quartz veins.

Also in the Dawson area, United Keno Hill Mines Ltd. trenched geochemical anomalies on the SUL property (5) on Bear Creek. One trench yielded an assay of 1.43 g per t of gold over a width of 5 m. The success of the Mount Skukum gold mine continued

to stimulate exploration in the Mount Skukum-Wheaton River area and the Montana Mountain-Bennett Lake area.

Kerr Addison Mines Ltd. drilled the LATER and SAID claims (15) in the Mount Skukum area under an option agreement with AGIP Canada Ltd. Some 928 m of drilling were completed on the LATER claims and 899 m in nine holes were completed on the SAID claims. The company also conducted work on the GLENLIVET and MAJI claims (d) near Mount Skukum.

Omni Resources Inc. continued working on its new gold discovery announced in 1985 on its Skukum Creek property on the south east face of Mount Reid (d), southeast of the Mount Skukum Mine. The Rainbow and Kuhn zones were further defined by 7 900 m of diamond drilling. Drill indicated reserves at 1986 year-end were estimated at 379 000 t grading 7.88 g per t of gold and 338 g per t of silver. In January 1987, the company announced that it would drive a 457-m long adit to provide underground access to the Rainbow zone for bulk sampling and underground drilling.

Shakwak Exploration Company Ltd. drilled 21 holes totalling 2 087 m on the Vesuvius Hill property (f), located north of the Mount Skukum Mine. The property was optioned from AGIP Canada Limited. Under a similar option, Shakwak drilled six holes totalling 365 m on the Dickson Hill property (16), located northeast of the Mount Skukum Mine.

Tally-Ho Exploration Company Ltd. conducted detailed mapping and soil sampling and completed three drill holes totalling 182 m on its Tally-Ho Mountain property (16), located northeast of the Mount Skukum Mine. The drilling program was designed to test areas where trench sampling yielded gold and silver assays.

Univex Mining Corp. conducted soil sampling and drilled six holes totalling 216 m on the Montana Mountain property (17), that was optioned from B. Watson.

The Ketz River (BOOM) gold property near Ross River (9) is owned by Canamax Resources Inc., Pacific Trans-Ocean Resources Ltd. and Ketz River Mines Ltd. The property was intensely explored by surface diamond drilling of 59 holes totalling 6 157 m to further define the Peel, Ridge and Break zones. The zones contain both auriferous iron oxide mineralization and auriferous massive sulphides in pipes and mantos deposits.

YUKON MINERAL EXPLORATION AND MINING - 1986

LEGEND



Producing Hardrock Mine

a United Keno Hill Mines Ltd., Ag, Pb, Zn, Cd
Dawson Eldorado Mines Ltd., Ag, Pb
Springmount Operating Co. Ltd., Ag, Pb

b Curragh Resources Corp., Pb, Zn, Ag

c Dawson Eldorado Mines Ltd., Ag, Pb

d Total Erickson Resources Ltd., Au

e Nadahini Mining Corp., Coal

f Whitehorse Coal Corp. Ltd., Coal

(20) Areas of Mineral Exploration Activity
Refer to Yukon Table and Text



LEAD-ZINC-SILVER



TUNGSTEN, TIN, MOLYBDENUM



GOLD, SILVER, PLATINUM



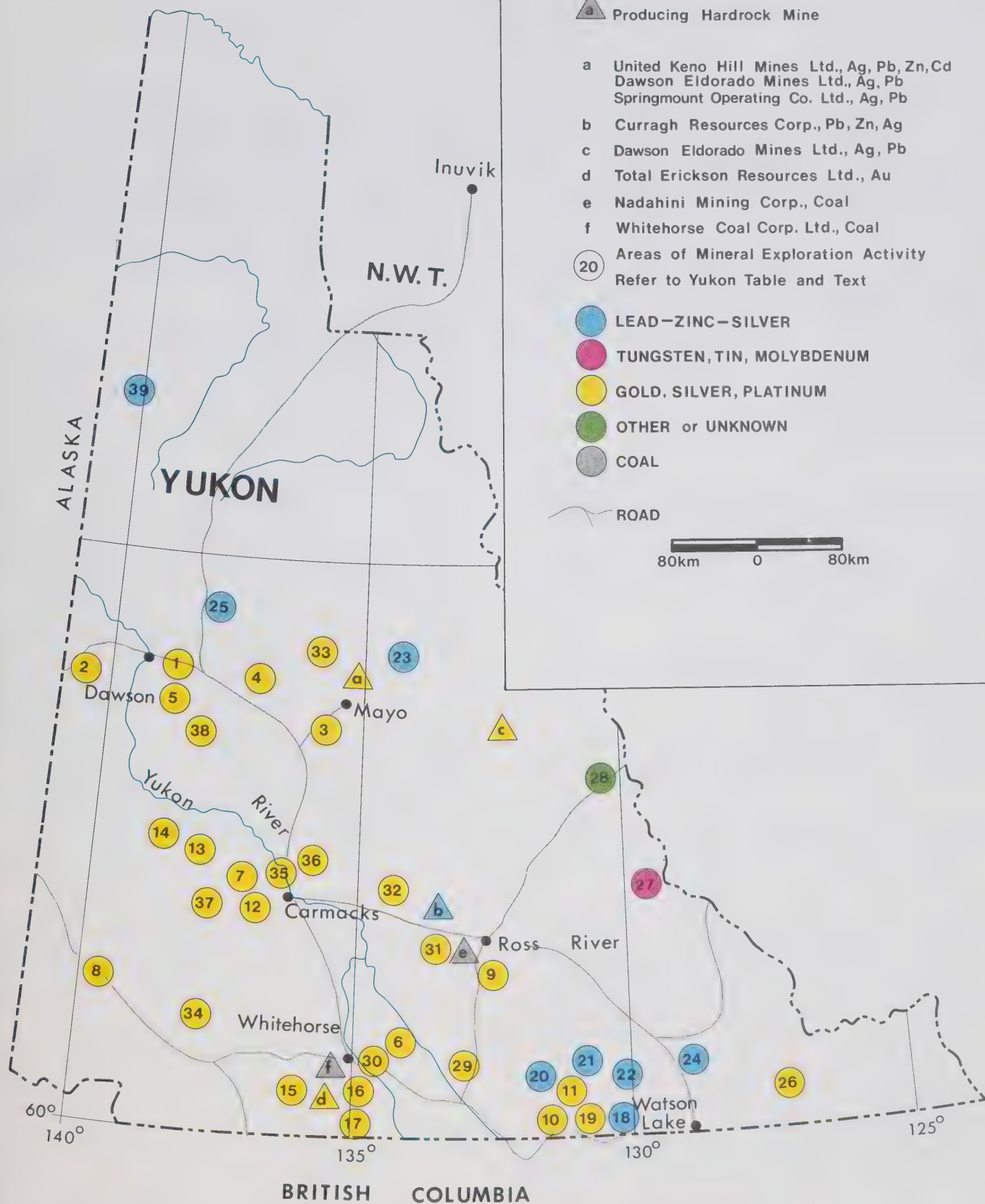
OTHER or UNKNOWN



COAL

ROAD

80km 0 80km



Silver-Base Metals

The Rancheria area (10) saw considerable exploration activity for silver in veins, mantos deposits and intrusive-associated breccias. Exploration for silver was also active in the Elsa area (a) and northeast of Elsa.

Getty Resources Ltd. drilled 15 holes on the LOGAN property (11) under an option agreement with Fairfield Minerals Ltd. The drilling indicated zinc-silver mineralization with widths up to 61 m and a strike length of 610 m. One hole intersected 86.5 m that averaged 5.15 per cent zinc and 10.3 g per t of silver. Higher-grade sections in four holes averaged 15 per cent zinc over widths of 10 m to 19.5 m. Further drilling is planned for 1987.

Getty Resources Ltd. under an option agreement with Fairfield Minerals Ltd. also completed 22 drill holes totally 2 413 m on the nearby MEISTER RIVER property (18). Drilling of the west zone intercepted oxide mineralization containing lead, zinc and silver values. Getty also conducted work on Fairfield's PL and TIM claims (18).

Goldex Resource Inc. conducted geophysical work and trenching on the A and B group of claims (19) in the Rancheria area.

Yukon Minerals Corporation completed a 12-hole drilling program totalling 600 m on the ORO claims (19) located to the south of the Silver Hart property.

United Keno Hill Mines Ltd. followed up airborne geophysical anomalies in the Rancheria area and conducted work on its KR (20) and MR claims (22).

United Keno Hill Mines Ltd. concentrated most of its exploration work in the Elsa area (a). The company completed 241 overburden drill holes totalling 10 996 m to test 11 geochemical and geophysical targets. Results were generally disappointing except at the Silver King 4 and 5 vein extensions and the Chief anomaly, where ore grade material was intersected.

All-North Resources Ltd. in joint venture with Chevron Canada Resources Ltd. and SMD Mining Co. Ltd. conducted trenching, soil sampling and geophysical surveys on the MARG (TUDL) claims (23), northeast of Elsa. Previous trenching and sampling revealed silver-copper-lead-zinc-gold mineralization.

Cahamax Resources Inc. completed a 37-hole diamond drilling program totalling 5 468 m on its Mount Hundere (24) zinc-lead silver property, north of Watson lake. At 1986 year-end, drill-indicated reserves were estimated at 1.76 million t grading 14.5 per cent zinc, 8.5 per cent lead and 56 g per t of silver. These reserves are additional to previously established reserves of 261 000 t grading 11.1 per cent zinc, 9.9 per cent lead and 118 g per t of silver.

Dawson Eldorado Mines Ltd. in joint venture with Canadian-United Minerals Inc. drilled two holes on the KIWI zinc prospect (25), 96 km north of Dawson. Seven small zinc-bearing carbonate veins were intersected.

Platinum Group Metals

Archer, Cathro and Associates (1981) Ltd., as operator for the joint venture of All-North Resources Ltd. and Chevron Canada Resources Ltd., conducted a rock and soil sampling program on the Wellgreen Mine property (8). The mine produced nickel-copper concentrate during 1972-1973. The property was optioned by the joint venture from Hudson Bay Mining and Smelting Co. Limited and the resulting 1986 program indicated potential for a tonnage of platinum-palladium mineralization. One chip sample taken over 9.7 m of the No. 1 zone of the mine assayed 2.44 per cent nickel, 1.1 per cent copper, 0.02 per cent cobalt, 0.9 g per t of gold and 6.8 g per t of platinum group metals. When mining ceased in 1973, reserves amounted to 454 000 t grading 2.04 per cent nickel, 1.42 copper, 0.03 cobalt, 2.02 g per t of platinum and palladium and 0.15 g per t of gold.

Mines and Mineral Activities

Northwest Territories

Mineral Production

Mineral production in the N.W.T. in calendar year 1986 was derived from eight mines, including four gold mines, three zinc-lead-(silver) mines and one tungsten mine. During the year, Canada Tungsten closed its mine because of low tungsten prices.

The value of the N.W.T.'s production shipments of minerals was \$656 million in 1986 compared with \$649 million a year earlier. Much of the 1986 increase in the production value was due to higher gold prices. However, lower zinc, silver and tungsten prices compared with a year earlier, combined with reduced tungsten output had a negative impact on total production value.

The combined mine-reported gold production from the four gold producers, the Lupin, Con, Giant and Salmita mines, increased by 5 per cent from the previous year to reach 13 380 kg of gold. The combined production of zinc and lead from the Pine Point, Polaris and Nanisivik mines also increased 4.3 per cent respectively from the previous year to reach 283 557 t of zinc and 80 591 t of lead. Most of the increase in production of zinc and lead was due to significantly increased output at the Pine Point Mine.

The mineral industry in the N.W.T. accounted for 100 per cent of the tungsten, 26.6 per cent of the lead, 26.9 per cent of the zinc, 12.9 per cent of the gold and 1.9 per cent of the silver produced in Canada during 1986. The value of these metals combined with by-product bismuth and cadmium accounted for 7.2 per cent of Canada's metallic mineral production in 1986 compared with 7.1 per cent in 1985.

Operating mines and mills in the NWT employed an average of 2 406 persons during 1986, including 164 contractors employees.

Table 3
Mineral Production of Operating Mines in the Northwest Territories, 1985 and 1986.

Company, Mine and Commodity	1985		1986	
	t	kg	t	kg
<i>Canada Tungsten Mining Corporation Limited</i>				
tungsten trioxide	3 717		1 782	
<i>Cominco Ltd.</i>				
Polaris Mine				
zinc	117 804		114 000	
lead	39 300		25 000	
<i>Echo Bay Mines Ltd.</i>				
Lupin Mine				
gold		6 069		6 009
silver		1 186		995
<i>Giant Yellowknife Mines Ltd.</i>				
Giant Mine				
gold		2 030		2 238
silver		568		767
arsenic trioxide	2 055		405.5	
<i>Salmita Mine</i>				
gold		1 981		1 529
silver		360		247
<i>Nanisivik Mines Ltd.</i>				
zinc	60 956		60 241	
lead	5 144		3 528	
silver		23 512		25 372
<i>Nerco Con Mine Ltd.</i>				
Con Mine				
gold		2 427		2 777
silver		633		574
arsenic trioxide	1.1		nil	
<i>Pine Point Mines Ltd.</i>				
zinc	161 379		238 625	
lead	56 174		109 815	

Source:
Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and may not match statistics Canada's production figure which are based on metals sold or shipped.

N.A.: Not Available



MINERAL EXPLORATION AND MINING NORTHWEST TERRITORIES — 1986

LEGEND



Producing Mines

- a Canada Tungsten Mining Co. Ltd., W, Cu
- b Pine Point Mines Ltd., Pb, Zn
- c Giant Yellowknife Mines Ltd., Au, Ag
Nerco Ltd.(Con Mine) Au, Ag
- d Cominco Ltd., (Polaris Mine), Pb, Zn
- e Giant Yellowknife Mines Ltd.
(Salmita Mine) Au, Ag
- f Nanisivik Mines Ltd., Pb, Zn, Ag
- g Echo Bay Mines Ltd., (Lupin Mine), Au, Ag



Road

- (12) Areas of Exploration Activity
Refer to N.W.T. Table and Text
- URANIUM
- GOLD, SILVER
- ZINC, LEAD, COPPER
- TUNGSTEN
- LITHIUM, DIAMOND, IRON, BARITE,
PLATINUM, BERYLLIUM, SOAPSTONE

Mines

Canada Tungsten Mining Corporation Limited, Cantung Mine

Operations at the Cantung Mine (a) were suspended on May 20, 1986 as a result of a strike. In August 1986, the mine was closed indefinitely because it had become uneconomic as world tungsten prices continued to decline during the year.

To May 20, 1986 the mill processed 136 984 t of ore grading 1.56 per cent tungsten trioxide (WO₃) to yield 1 782 t of tungsten trioxide contained in scheelite concentrate.

During 1986, Canada Tungsten Mining Corporation acquired most of the tungsten assets of its principal shareholder, Amax Inc. Canada Tungsten thereby acquired the Mactung tungsten deposit, located 176 km north of the Cantung Mine. The Cantung Mine is the western world's largest tungsten mine and Canada Tungsten officials believe that the Mactung property will eventually be developed into one of the largest western world tungsten mines.

Type:	Underground
Location:	Tungsten
Product:	Tungsten in scheelite concentrate
Mill Capacity:	1 000 tpd
Tonnes Milled:	136 984 t
Reserves:	1.16 million t (Dec. 31, 1986)
Reserve Grade:	1.26 % WO ₃
Employees:	203 before production ceased in May 1986

Cominco Ltd., Polaris Mine

Cominco's Polaris zinc-lead mine (d), on Little Cornwallis Island, is the world's most northerly base metal mine. In 1986, the Polaris mill processed 886 000 t of ore compared with 939 000 t a year earlier. The reduced level of output was a result of a six-week mid-summer 1986 shutdown designed to control concentrate levels in response to weak zinc prices. Both mine-reported zinc and lead concentrate production were down marginally at 182 100 t of zinc concentrate and 32 000 t of lead concentrate compared with 190 700 t and 39 300 t respectively for the previous year. The metal contained in

the 1986 production amounted to approximately 114 000 t of zinc and 25 000 t of lead. The annual production of concentrate is shipped primarily to European smelters in a 12-week season at the end of the northern summer when Arctic shipping lanes are open for navigation.

Type:	Underground
Location:	100 km northwest of Resolute
Product:	Zinc, lead
Mill Capacity:	2 100 tpd
Tonnes Milled:	885 843 t
Reserves:	18.0 million t (Dec 31, 1986)
Reserve Grade:	14.5 % zinc and 3.9 % lead
Employees:	252 (plus 5 contract)

Echo Bay Mines Ltd., Lupin Mine

The company's Lupin gold mine (g) is located on the barrenlands, near the west shore of Contwoyto Lake, 400 km northeast of Yellowknife. This major mine depends entirely on air transport and winter road transport for resupply and the rotation of personnel. In 1986, the Lupin mill processed 605 000 t of ore. The mine produced 6 009 kg of gold and 995 kg of silver compared with 6 069 kg of gold and 1 186 kg of silver during 1985.

In late 1986, after some 20 months of shaft sinking from the 390 m level, the extended Lupin shaft reached to a depth of 779 m. The sinking program will be completed at a depth of 790 m early in 1987. Lateral development from the 650 m Level and development drilling from this level confirmed the extension of the ore deposit to this depth. Published ore reserves should increase substantially in 1987 when the underground development program will be completed.

Type:	Underground
Location:	400 km northeast of Yellowknife
Product:	Gold, silver
Mill Capacity:	1 580 tpd
Tonnes Milled:	605 000 t
Reserves:	2.77 million t (Dec. 31, 1986)
Grade:	10.67 g/t gold
Employees:	391 (plus 58 contract)

*Numbers or letters in parentheses indicate the location of the property on the map.

Giant Yellowknife Mines Ltd., Giant Mine

The Giant Mine (c), near Yellowknife, has been a major gold producer in the N.W.T. since 1948, when the mine commenced production. In August 1986, Falconbridge Ltd. sold its controlling interest in Giant Yellowknife Mines Ltd. to Pamour Inc. Production at the Giant Mine increased in 1986 to 2 238 kg of gold and 767 kg of silver compared with 2 030 kg of gold and 568 kg of silver in 1985.

Type:	Underground with one small open pit on surface
Location:	2.4 km north of Yellowknife
Product:	Gold, silver
Mill Capacity:	1 000 tpd
Tonnes Milled:	292 167 t
Reserves:	2.58 million t (Dec. 31, 1986)
Reserve Grade:	8.6 g/t gold
Employees:	308 (plus 13 contract)

Giant Yellowknife Mines Ltd., Salmita Mine

The Salmita Mine (e) is located on the barrenlands, at Matthews Lake, 256 km northeast of Yellowknife. In 1983, the Salmita Mine was developed, and mill production commenced at the Tundra Mill, 5 km south of the mine. In recent years, the mine has proven to be a small but competitive high-grade gold producer. Giant Yellowknife plans to close the mine and mill operation in early 1987 because the mine's ore reserves will be depleted.

During 1986, 63 381 t of ore grading 25.1 g per t of gold from the Salmita Mine and nearby Red claims were treated at the Tundra mill to yield 1 529 kg of gold and 247 kg of silver. This mill-feed tonnage includes approximately 10 000 t of ore that was mined on the RED claims a few miles north of the Salmita Mine.

Type:	Underground
Location:	256 km northeast of Yellowknife
Product:	Gold, silver
Tonnes Milled:	63 381 t
Mill Capacity:	145 tpd
Reserves:	10 886 t (Dec. 31, 1986)
Reserve Grade:	25.7 g/t gold
Employees:	63 (plus 28 contract)

Nanisivik Mines Ltd., Nanisivik Mine

Nanisivik Mines Ltd. (f), wholly owned by Mineral Resources International Limited (MRI), was incorporated for the development of the Nanisivik zinc-lead-silver mine, near Arctic Bay, Baffin Island. The mine is 700 km north of the Arctic Circle. During 1986, the tenth full year of production at the Nanisivik Mine, MRI completed the purchase of all minority interests, including the federal government's 18 per cent equity interest in the mine and Canada Development Corp.s' 35 per cent royalty interest in production of the mine.

In 1986, the Nanisivik mill processed 685 000 t of ore to produce 107 000 t of zinc concentrate containing 60 241 t of zinc and 7 000 t of lead concentrate containing 3 528 t of lead. Silver contained in the concentrate amounted to 25 372 kg. The company conducted an exploration program in the area in search for satellite ore zones which could extend the life of the mine.

Type:	Underground
Location:	27 km east of Arctic Bay Baffin Island
Product:	Zinc, lead, silver
Mill Capacity:	2 000 tpd
Tonnes Milled:	685 000 t
Reserves:	2.82 million t (January 31, 1987)
Reserve Grade:	9.9 % zinc, 0.3 % lead, 40 g/t silver
Employees:	187 (plus 4 contract)

NERCO Con Mine Ltd., Con Mine

The Con Mine near Yellowknife (c) was developed and operated by Cominco Ltd. from 1938 to 1986, making the mine the oldest producing mine in the N.W.T. In mid-December 1986, Cominco Ltd. sold the Con Mine to NERCO Minerals Company of Fairbanks, Alaska, and the mine was then operated by a newly-formed NERCO subsidiary, NERCO Con Mine Ltd.

During 1986, the Con mill processed 198 000 t of ore grading 15 g per t of gold to produce 2 777 kg of gold and 574 kg of silver.

Type:	Underground
Location:	1.4 km south of Yellowknife
Product:	Gold, silver
Mill Capacity:	590 tpd
Tonnes Milled:	198 000 t
Reserves:	1.3 million t (estimated)
Reserve Grade:	14.4 g/t gold
Employees:	331 (plus 13 contract)

Pine Point Mines Limited, Pine Point Mine

The Pine Point Mine is currently the largest mine in the N.W.T. in terms of ore throughput, base metals production and employment. Cominco Ltd. owns 50 per cent of Pine Point Mines Limited and its zinc-lead property on the south shore of Great Slave Lake (b). All of the zinc concentrate produced in 1986 was sold and railed to Cominco's metallurgical plants at Trail, B.C., while most of the lead was shipped to an associated company in Japan, Mitsubishi Cominco Smelting Co. Ltd.

In 1986, operations at Pine Point resulted in record zinc and lead concentrate production, because significantly higher operating rates were planned and achieved. The Pine Point mill processed 2.97 million t of ore to produce 415 307 t of zinc concentrate containing 238 625 t of zinc and 148 600 t of lead concentrate containing 109 815 t of lead. Although most of the lead production was sold during the year, higher zinc production resulted in the addition of 171 500 t of zinc concentrate to the mine's inventory.

In January 1987, the company announced that the accelerated mining and milling program at Pine Point, which started in January 1986, will continue to July, 1987 at which time the mine will close. Pine Point's central mill operation will continue processing ore until the end of 1987. It is expected that shipping of stockpiled concentrate to customers will continue up to three years after milling stops and the inventory accumulation will reach 363 000 t of zinc concentrate at the end of 1987, when production ceases.

A \$2-million exploration program was implemented on the Pine Point property in 1986 and a similar program will be conducted in 1987.

Type:	Open-pit
Location:	Pine Point
Product:	Zinc, lead
Mill Capacity:	9 100 tpd
Tonnes Milled:	2 967 386
Reserves:	3.36 million t (December 31, 1986)
Reserve Grade:	3.5 % lead, 9.6 % zinc
Employees:	456 (plus 43 contract)

Development

Underground development work was conducted on three gold properties: Giant Bay Resource's Gordon Lake property, Terra Mine's Bullmoose Lake property and Treminco's Tom property, all in Slave Province, north of Great Slave Lake.

Giant Bay Resources Ltd.

The company conducted underground development to define the Kidney Pond gold prospect in the Knights Bay area, Gordon Lake (13). A decline was advanced 487 m from entry to the 60 m level and a drift was extended a further 165 m. The work also included 165 m of raising, 1 800 m of underground diamond drilling and 760 m of surface drilling. Earlier drilling campaigns had outlined 294 000 t grading 8.16 g per t at a shallow depth. Further work is planned for 1987 to define the tonnage and grade of gold mineralization in the prospect.

Terra Mines Ltd.

In 1986, the company continued a major development program on its Bullmoose Lake gold property (13) for the third consecutive year. The program included 2 952 m of lateral development, 988 m of vertical development, 6 661 m of underground diamond drilling and 2 917 m of surface drilling. Terra employed an average of 53 persons during the year on the site.

After reviewing its 1986 development program, Terra Mines decided not to proceed with full-scale development of a mine. During 1986, 46 140 t of ore were broken underground and 42 238 t of ore were processed in a 170 t per day pilot mill that was erected on the property. The total mill recovery of gold amounted to 231.6 kg of gold contained in concentrate.

As of December 31, 1986, reserves at Bullmoose were 16 787 t grading 8.07 g per t of gold. The pilot mill was expected to continue operating until early June, 1987.

Tremingo Resources Ltd.

The company, in a joint venture with Goldrich Resources Inc., drove a decline on its Tom property, south of Prosperous Lake (c) to develop gold reserves for small-scale mining. Some 823 m of development led to the mining of approximately 9 000 t of ore from the Tom vein. This ore was trucked to Giant Yellowknife's mill near Yellowknife. About 53 kg of gold were produced from the mill feed, which averaged 6.8 g per t of gold. Prior to the 1986 development work, reserves were estimated at 13 600 t grading 11.8 g per t of gold. Tremingo employed an average of 10 persons on the project during the year.

In September 1986, Tremingo obtained an option to purchase the nearby Ptarmigan Mine property, which contains 102 511 t grading 10.58 g per t of gold. Tremingo plans to redevelop the mine and start mine production in 1987.

Mineral Exploration

Mineral exploration and pre-production development expenditures in 1986 are estimated to be about the same magnitude as in 1985, when expenditures amounted to \$46.8 million.

Of 130 exploration projects conducted in the N.W.T. in 1986, 105 were directed to gold and the remainder to base metals, platinum group metals, and uranium. The significant increase in gold prices during 1986 compared with the previous year was an added incentive for gold exploration. Expenditures on gold exploration in the N.W.T. probably exceeded \$25 million with most of the activity being concentrated in Slave Province, north of Great Slave Lake. To a lesser extent, gold exploration was active in Keewatin District, west of Hudson Bay. Base-metal exploration projects were mainly confined to areas near or within the mine properties of the Pine Point, Polaris and Nanisivik mines. Also the staking of ultramafic rocks for potential platinum group elements (PGE) was stimulated by higher prices.

Among the leading projects, Noranda Exploration Company Ltd. in a joint venture with Getty Resources Ltd. continued to delineate a major gold deposit on

the Tundra property in the Courageous Lake-Mackay Lake area (e). Also Aber Resources Ltd. reported encouraging gold assays from drill intersections on the BUGOW property in the Russell Lake area (1) and Echo Bay Mines Ltd. reported encouraging drilling results from the Cass zone on its KIM claims in the Indin Lake area (2), all in Slave Province.

Table 4
Claims Recorded in the Northwest Territories, 1985 and 1986

Mining District	1985		1986	
	Number of Claims	Area (hectares)	Number of Claims	Area (hectares)
Mackenzie	392	242 340	449	291 202
Arctic and Hudson Bay	64	50 700	82	69 160
Nahanni	3	1 840	0	0
Total	459	294 880	531	360 362

Exploration Projects

Gold Exploration in Slave Province

A number of companies explored for iron formation hosted gold deposits in turbidites, which extend from northeast of Bathurst Inlet south westerly to Fort Rae on the southwestern edge of Slave Province. Almost all of the projects in the northern half of Slave Province were directed to the location and testing of Lupin-type gold targets in iron formation or amphibolitic metasediments. The active areas include areas east and west of Bathurst Inlet (3) (6), the Beechey Lake area (7), the Contwoyto Lake-Itchen Lake belt (g) and the Russell Lake area (1). In the Contwoyto-Itchen Lakes area, where Echo Bay's Lupin Mine is located, intensive exploration to find similar gold-bearing iron-formation has been in progress for several years.

The search for volcanic-hosted gold deposits continued on a number of volcanic belts in Slave Province including the Courageous Lake - Mackay Lake volcanic belt (e) which, was particularly active. Also, many small operators and prospectors searched for small high-grade deposits in the Burwash Formation turbidites, east of Yellowknife.

Aber Resources Limited and Highwood Resources Limited reported encouraging drill results on the BUGOW gold property in the Russell Lake area (1). Sixteen holes located gold-bearing intersections of sulphide-rich amphibolitic iron formation ranging from 1.5 to over 8.8 m. The best intersection was 11.1 m grading 13.7 g per t of gold. The drill results sparked a staking rush in the area.

On the SP property (1), six miles east of the BUGOW property, Aber Resources Limited put down five holes to test gold showings. Aber also conducted exploration on the Jax Lake property and on the BUD claims in the Courageous Lake area (e), on the AP claims in the Cameron River area (13) and on the FUR and DY claims in the Indin Lake (2) area. Previous drilling on the JAX one and two zones of the Jax Lake property outlined 36 000 t grading 13.7 g per t of gold in quartz veins hosted in mafic volcanics.

Aurun Mines Ltd. conducted VLF-EM and magnetometer surveys on its COM 1,2 claims (g) southwest of Contwoyto Lake.

The Back River Joint Venture, for whom Trigg, Woolett and Olsen Consulting Ltd. was operator, explored prospecting permits and claims in the Beechey Lake area (7). Work included a ground follow-up to a

DIGHEM airborne EM survey, by ground EM and magnetic surveys and diamond drilling.

Bow Valley Industries Ltd. conducted EM, gradiometer and magnetometer surveys on several of its claims in the Contwoyto Lake (g) area. Twenty-two holes totalling 2 167 m were completed and a number of narrow intersections yielded gold assays.

Brinco Ltd. explored the WEST claim (g), west of the Lupin Mine, by conducting a magnetic survey and drilling nine holes.

Canuc Resources Inc. resumed work on the ARCADIA property (5). Fourteen holes were drilled on the Fred Vein and soil sampling and a VLF-EM survey were performed on an extension of the North Vein.

Comaplex Resources International Ltd. and Petromet Resources Ltd. conducted sampling surveys on the SPAN claims (2) in the Indin Lake Volcanic Belt. Two auriferous zones were identified in mineralized mafic volcanic rocks.

Cominco Ltd. explored the CTL, DIGGER and other claims (g) on the west side of Contwoyto Lake by conducting EM and magnetic surveys. Twelve targets were drilled. The company also drilled four holes and completed 8.5 line km of ground magnetic surveying on the BUGOW claims (1) in the Russell Lake area. Additional drilling on the claims was done in 1986 by Aber Resources Ltd., after Cominco relinquished its option on the property. In the Courageous Lake-Mackay Lake Volcanic Belt (e), Cominco drilled four holes on the MOG claims and three holes on the BLAKE claims to test IP anomalies. These claims cover the northern extension of the volcanic succession hosting the Tundra (FAT) gold deposit, which is being explored by Noranda Exploration Company Ltd. and Getty Resources Ltd.

Echo Bay Mines Ltd. significantly reduced the level of its exploration in the N.W.T. The company concentrated its effort on iron-formation targets both east (3) and west (6) of Bathurst Inlet and on the KIM property (2), where gold is associated with volcanic rocks. East of Bathurst Inlet magnetic surveys were conducted on the HUNT 1, 12, EGG and BEAR claims (3,4), where the principal target was gossanous amphibolite. South of James River, Echo Bay geophysically prospected the DOUGALL 1-4 claims (6).

In the Indin Lake Volcanic Belt, Echo Bay Mines Ltd. drilled 27 holes totalling 3 026 m on the newly discovered Cass zone and 2 000 m in the Main zone, on the KIM claims (2). Echo Bay is the operator of this property, which is held in joint venture with Comaplex Resources International Ltd. and Petromet Resources Ltd. Preliminary results indicated that the Cass zone is an auriferous quartz stockwork in a gabbro host. Some 2.7 million t grading 7.46 g per t of gold has been indicated by drilling over a strike length of 300 m and an average width of 4.8 m. In the Main zone, 3 km northwest of the Cass zone, drilling has extended the strike length of the zone to 749 m, with an average width of 4.6 m. The deepest hole has encountered the zone at a depth of 366 m and the average indicated grade is 6.53 g per t of gold.

Giant Yellowknife Mines Limited explored on the ALGOOD claims (8) in the Regan Lake area and on the TREE and TESS claims (11) in the Tree Lake area. Work included ground magnetic, VLF-EM, HL-EM and MaxMin-EM surveys. Closer to Yellowknife, in Southern Slave Province, the company conducted work, including ground geophysical surveys on the KA claims (12) in the Bridge Lake area, on the TORO claims (13) in the Sophia Lake area, on the GIVER claims (14) in the Amacher Lake area, on the COKE claims (13) in the Fenton Lake area and on the SHEET claims (14) in the Sunset Lake area. An airborne geophysical survey was flown over the GYM and BRI claims (15) in the Indian Mountain Lake area. The claims are held in joint venture with Asamera Incorporated and Kelmet Resources Ltd. Lithogeochemical and soil sampling surveys and trenching were conducted on these joint-venture properties.

Golden Marlin Mines Ltd. continued to explore its extensive MARLIN property (16) at the south end of the Yellowknife Volcanic Belt, in Yellowknife Bay. A waterborne seismic survey detected anomalies that were tested by drilling 21 holes totalling about 2 100 m through the ice. The inferred shear zones were confirmed and low-grade gold intersections were reported.

Golden Rule Resources Ltd. conducted airborne magnetic and EM surveys over the CASS 7 and DAVE claims (2) in the Indin Lake area. Samples of sheared volcanic rock from the CASS 7 claims contained anomalous gold values of 2.0 to 2.4 g per t of gold.

Hecla Mining Company of Canada Ltd. conducted ground EM and magnetic surveys on the JOHN, SHIN and DLER claims (g) east of Contwoyto Lake. Anomalies were investigated by sampling.

Neptune Resources Ltd. negotiated an agreement with Johnsby Mines Ltd. to acquire a 60 per cent interest in the Colomac deposit (2) in the Indin lake area. Previous drilling indicated reserves of 11.8 million t grading 2.9 g of gold per t.

Noranda Exploration Company Ltd. conducted airborne DIGHEM VLF-EM and magnetic surveys over property staked in the Russell-Slemon Lake area (1). In the Clan Lake area, a similar airborne survey was completed over the BOSS claims (c). Ground work on both properties included soil sampling.

On the Tundra property (e), in the Courageous Lake-Mackay Lake Volcanic Belt, held jointly by Noranda and Getty Resources Ltd., drilling was conducted on the Fat gold zone (Main gold zone). Prior to 1986, significant gold resources had been delineated by 8 000 m of drilling in 41 holes to a depth of 120 m along a strike length of 1 200 m. The reserves indicated by this drilling amounted to 1.16 million t grading 9.6 g per t of gold. The 1986 deep-drilling program has traced the zone to a depth of 600 m. In 1987, the joint-venture will drill 9 000 m in the Fat (Main) zone with the objective of outlining 4.5 million t of mineable ore. The Tundra (FAT claims) property covers 45 km of favourable felsic volcanoclastic rocks and higher-grade deposits of a smaller size have been located to the west of the Fat zone.

Robinson Investments Ltd. and Genesis Resources Corporation conducted rock geochemical, EM and magnetic surveys on the JOON lease and contiguous claims in the Bullmoose Lake area (13).

Suncor Incorporated completed a winter geophysical program on property optioned from Treasure Island Resources Limited in the Spider Lake area (2), north of Indin Lake. The program included 90 km of ground magnetometer and VLF-EM surveying and 15 km of MaxMin EM surveying. During the summer, trenching and chip sampling led to delineation of nine new gold showings with grades of 3.4 to 37 g per t of gold across 0.7 to 2.0 m.

Silver Hart Mines Ltd. flew DIGHEM surveys over their extensive claims holdings in the Hood River area (6) and over the G & T, FOX and CHAR claims (3) on the east side of Bathurst Inlet. Trenching was conducted on prospects in the Turner Lake (6) and Pistol Lake areas, north and south respectively of Wilberforce Falls. The target was a Lupin-type pyrrhotite-bearing iron formation in Yellowknife Supergroup turbidites. The company drilled an iron formation target on the G & T claims and also conducted geophysical surveys and drilled a target at Katherine Lake (3).

Terra Mines Limited conducted extensive exploration and development work on its Bullmoose Lake property (13) (see under Development). Elsewhere in Slave Province, Terra conducted trenching and sampling surveys on the WOLF claims on the Spencer Lake area and on the TT claims at Dome Lake (13).

Welcome North Mines Ltd., as operator in joint venture with Bow Valley Industries Ltd., explored claim blocks in the Thistle Lake area (8) and, in the Beechey Lake area (7) by prospecting and trenching. A gold showing on the BOW claims (7) on the northern part of the Beechey Lake property yielded gold values but no drilling was done. Welcome North also prospected the RING 1-3 claims held by the joint venture in the Back River area (8).

Taiga Consulting Ltd. on behalf of Troymin Resources Ltd. drilled 11 shallow holes to test gold-bearing zones on the MON lease (c) in the Discovery Lake area. The lease is held by Cominco Ltd.

Utah Mines Ltd. conducted rock chip sampling and a geophysical survey on the RAND claims (c), east of Yellowknife.

Gold Exploration in the District of Keewatin

At least 18 properties in areas of the District of Keewatin that are considered favourable for gold were explored.

Asamera Inc. optioned a number of properties in the Baker Lake area from Comaplex Resources International Ltd. Work on prospecting permits and claims northwest of Tehek Lake (20) included geochemical and geophysical surveys and diamond drilling of gold-bearing quartz sulphide veins in felsic volcanics. Other properties in the area were prospected.

Borealis Exploration Limited continued work in an effort to establish the extent of the Fat zone gold showings discovered in 1985, near Fat Lake (23), southwest of Rankin Inlet. Magnetic, VLF-EM and MaxMin-EM surveys were completed and 19 holes totalling 1 278 m were drilled during the winter months of 1986. In the north zone, a 20-hole drilling program amounting to 644 m was completed during the spring season. The winter drill program on the Fat zone yielded very good gold assays across intersections of 0.7 m to 3.2 m. The winter drill program on the north zone intersected 2.8 m grading 1.3 g per t of gold and other higher-grade but narrower intersections.

Canadian Nickel Company Ltd. prospected its permits on the shore of Wilson Bay (24) by conducting geological, geophysical and lithogeochemical surveys.

Homestake Mineral Development Company Ltd. in a joint venture with Abermin Corporation explored properties southwest of Yathkyed Lake (27). Lithogeochemical and geophysical surveys were conducted and 12 holes were drilled along a strike distance of 10 km to investigate auriferous sulphide-facies iron formation. Ten of the holes returned anomalous gold values.

Noble Peak Resources acquired a prospecting permit north of Happotiyik Lake (23) from Borealis Exploration Limited and conducted exploration work.

Gold Exploration in Other Regions

Giant Yellowknife Mines Limited prospected, trenched and drilled four holes totalling 242 m on the GRUMP claims (17), southeast of Macmillan Pass.

Near the Yukon-NWT boundary, Serem Incorporated prospected the CHUCK claim (18) where previous surveys had identified a gold-arsenic geochemical anomaly.

Base Metals

In 1986, base metals exploration activity was concentrated in the vicinity of the three producing zinc-lead mines: the Pine Point, Polaris and Nanisivik mines.

At the Nanisivik Mine (f) exploration consisted of geophysical surveys and drilling of targets on areas east of the mine and also west of the mine lease.

Pine Point Mines Ltd.'s on-property exploration program (b) was funded by a \$2 million flow-through share issue. Work included IP surveys and drilling in search for Mississippi Valley-type zinc-lead deposits.

At Cominco Ltd.'s Polaris Mine (d) exploration drilling was limited to testing the South Keel zone of the Polaris zinc-lead deposit for southern ore extensions. Two important drill intersections were made in January 1987.

Noranda Exploration Ltd. conducted geophysical surveys and trenching on Panarctic Oil Ltd.'s Holy Cow native copper showings on Victoria Island (28). Trenching showed that most of the mineralization was not in place and was not economically significant.

Silver Hart Mines reported the discovery of a large body of disseminated to semi-massive nickel-cobalt-copper mineralization in the Turner Lake area (6) west of Bathurst Inlet.

Uranium

In Bear Province, CEGB Exploration (Canada) Ltd. conducted work on Prospecting Permit (PP) 1013, near Dumas Lake (32) and PP 1098 and 1099 near Longtom Lake (33). Work included soil geochemistry and geophysics.

In the Keewatin District, PNC Exploration (Canada) Ltd. explored ground optioned from BP Minerals Ltd., west of Baker Lake, and south of Schultz Lake (34). Prospecting and a DIGHEM EM survey were conducted. The company also conducted a surface glacial drift survey and a scintillometer survey over uranium prospects north of Marjorie Lake (36).

Urangesellschaft Canada Ltd. conducted diamond drilling on the Main and Centre zones of its Lone Gull uranium deposit (34), west of Baker Lake. Also ground geophysical surveys and diamond drilling were conducted on uranium showings and geophysical anomalies near Pointer Lake (35) southwest of the Lone Gull property. A DIGHEM EM survey was flown over the area.

Platinum Group Metals

Increased prices stimulated exploration for platinum group metals in 1986. As a result the layered mafic/ultramafic Muskox Intrusion (37), northeast of

Great Bear lake, was largely staked by Equinox Resources Ltd. and by International Platinum Corporation.

Equinox Resources Ltd. in joint venture with Technigen Platinum Corporation completed a seven-hole diamond drilling program on the SPEE claims near Speers Lake (37). All holes intersected platinum and palladium values with the best intersection being 1.12 g of platinum plus 3.0 g of palladium over a core interval of 3.0 m.

International Platinum Corporation explored the Muskox Intrusion near McGregor Lake and Speer Lake (37). As a result of a rock sampling program, a mineralized zone was identified. Chip samples taken over 0.3 and 0.8 m gave values of 1.55 g and 0.87 g respectively of platinum plus palladium.

East of Great Slave Lake, Enexco International Resources Ltd. drilled geophysical targets on its Rutledge Lake claims (30), in order to test the copper-nickel and platinum group metal potential of ultramafic rocks in the area.

Tungsten

Hudson Bay Exploration and Development Co. Limited conducted a soil geochemistry and heavy mineral sampling program on its QUICK and EASY claims (42), northwest of the Cantung Mine.

Beryllium and Rare Earth Elements

Highwood Resources Ltd. drilled 14 holes totalling more than 1 300 m on its Thor Lake beryllium deposit (41), southeast of Yellowknife. In July, 1986 Highwood announced an agreement with Hecla Mining Company Ltd. whereby the companies would proceed jointly with development of the property.

Table 5
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	Aber/Highwood BUGOW	Au	
1	Aber	SP	Au
1	Noranda	Russell Lake	Au
2	Suncor/Treasure Island Spider Lake	Au	
2	Golden Rule	CASS, DAVE	Au
2	Echo Bay	KIM	Au
2	Aber	FUR, DY	Au
2	Comaplex/Petromet	SPAN	Au
2	Delaware	Indin Lake	Au
3	Silver Hart	Katherine Lake	Au
3	Echo Bay	HUNT, BEAR, JAN	Au
3	Silver Hart	G, T, FOX, CHAR	Au
3	Echo Bay	Gambit Lake	Au
3	Enexco		Au
4	Echo Bay	EGG, SHEL, WING	Au
5	Canuc	ARCADIA	Au
5	Utah Mines	Anialik River	Au
5	Utah Mines	High Lake	Au
6	Echo Bay	DOUGALL	Au
6	Silver Hart	Hood River	Au
6	Silver Hart	Turner Lake	Ni, Co, Cu
7	Back River JV	Beechey Lake	Au
7	Welcome North	BOW, BEEP, DEL	Au
8	Giant Yellowknife	ALGOOD	Au
8	Welcome North	THISTLE	Au
8	Welcome North/Bow Valley	RING	Au
9	Silver Hart	Mara River	Au
9	Cominco	VER, SGJV	Au
10	Utah Mines	Takijuq Lake	Au
10	Echo Bay	RUSH, CUB	Au
11	Giant Yellowknife	TREE, TESS	Au
11	Utah Mines	Redrock Lake	Au
12	Giant Yellowknife	KA	Au
13	Ardic	Thompson-Lundmark	Au
13	Terra	(TA) Bullmoose Lake	Au
13	Genesis	JOON	Au
13	Aber	AP	Au
13	Giant Bay	Gordon Lake	Au
13	Giant Yellowknife	COKE, TORO	Au
13	Terra	WOLF, TT	Au
14	Noranda	Weaver Lake	Au
14	Giant Yellowknife	GIVER, SHEET	Au
15	Giant Yellowknife	BRI, GYM	Au
16	Golden Marlin	MARLIN	Au
16	G. Sage	Outpost Island	Au, Cu, W
17	Giant Yellowknife	GRUMP	Au

Table 5 (continued)
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
18	Serem	CHUCK	Au
19	Asamera/Comaplex	Laughland Lake	Au
20	Asamera/Comaplex	Tehek and Whitehills Lakes	Au
21	Asamera/Comaplex	Judge Sissons Lake	Au
22	Asamera/Comaplex	Macquoid and Brown Lakes	Au
23	Borealis	Fat Lake	Au
23	Borealis	Kaminak Lake	Au
23	Noble Peak	Happotiyik Lake	Au
24	Canadian Nickel	Wilson Bay	Au
24	Borealis	Gill Lake	Au
25	Sunmist	Maguse Lake	Au
26	Borealis	Yandle Lake	Au
27	Homestake	Yathkyed Lake	Au
28	Noranda	Shaler Mountains	Cu
29	Borealis	Melville Pen.	Zn, Ni
30	Enexco	Rutledge Lake	Cu, Ni
31	Procan	Prairie Creek	Pb, Zn, Ag
32	CEGB	Dumas Lake	U
33	CEGB	Longtom Lake	U
34	Urangesellschaft	LONE GULL	U
34	PNC	Schultz Lake	U
35	Urangesellschaft	Pointer Lake	U
36	PNC	Marjorie Lake	U
37	Equinox/Technigen	SPEE, VAL	Pt
37	International Platinum	OX	Pt
38		PLATINUM	Pt
39	Homestake	Ferguson Lake	Pt
40	Comaplex	Rankin Inlet	Pt
41	Highwood/Hecla	Thor Lake	Be, REE
42	Hudson Bay	QUICK, EASY	W
43		Hope Bay	Soapstone
b	Pine Point	Pine Point Mine	Pb, Zn
c	Treminco	Tom Mine	Au
c	W. Humphries/J. Kelly	WAL, TING, EQUINOX	Au
c	Troymin	MON	Au
c	Utah Mines	RANK	Au
c	Noranda	BOSS	Au
e	Noranda/Getty	FAT	Au
e	Aber	BUD	Au
e	Cominco	MOG, BLAKE	Au
f	Nanisivik		Zn, Pb, Ag
g	Aurun	COM	Au
g	Cominco	CTL, DIGGER	Au
g	Brinco	WEST	Au
g	Bow Valley	Contwoyto Lake	Au
g	Hecla	JOHN, SHIN, DLER	Au
g	Utah Mines	Olga Lake	Au
g	Echo Bay	CAR	Au

Table 6
Exploration - Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	White Channel	Jackson Hill	Placer Au
1		Klondike	Placer Au
2	Klondike Underground	Miller Creek	Placer Au
2		Sixty Mile	Placer Au
2	Noranda	LGC	Au
3		McQueston	Placer Au
4	Queenstake	Clear Creek	Placer Au
5		Stewart River	Placer Au
5	Queenstake	Maisy May Creek	Placer Au
5	United Keno Hill	SUL	Au
5	United Keno Hill	BEA	Au
5	Arbor/Dawson Eldorado	LONE STAR	Au
6	Silverquest	LOON	Au
6		Livingstone Creek	Placer Au
7		Carmacks	Placer Au
7	Noranda	EMMONS HILL	Ba, Hg, Sn
7	Archer, Cathro	NUCLEUS	Au
7	Archer, Cathro	GOLDSTAR	Au
7	Permian/Nordac	GUDER	Au
7	Nordac	ANTONIUK, REVENUE	Au
8	All-North/Chevron	WELLGREEN Pt, Ni, Cu, Au	
8		Kluane	Placer Au
9	Canamax/Pacific Trans-Ocean	Ketza River	Au
10	A.M.P. Explorations	LOGJAM	Ag
11	Silver Hart	MIDNIGHT, CMC	Ag, Pb, Zn
12	Chevron	Brown-McDade	Au
12	Kerr Addison	VIC, DIC, LONELY	Au
12	Welcome North	ETZAL	Au
12	Archer, Cathro	J. BILL, TAWA	Au
13	Silverquest	NIT	Ag, Au
13	Noranda	DELTA	Au
13	Kerr Addison	SIZZLER	Au, Ag, Sb
14	Silverquest	Idaho Creek	Au, Ag
15	Kerr Addison	LATER, SAID	Au
16	Shakwak	Dickson Hill	Au
16	Tally-Ho	TALLY-HO	Au
16	Anina	ROB	Au, Ag
16	Berglynn	BECKER-COCHRAN	Sb
17	Univex	Montana Mountain	Au
18	Getty/Fairfield	MEISTER RIVER	Ag, Pb, Zn
18	Getty	PL, TIM	Pb, Zn
19	Yukon Minerals	ORO	Ag
19	United Keno Hill	HOLLIDAY	Ag
19	Cordilleran/Fairfield	LOGAN	Zn, Ag
19	Goldex	A, B	Ag, Pb
20	United Keno Hill	KR	Pb, Zn, Ag
21	Tally-Ho	Cabin Creek	Ag, Pb
21	Shakwak/Nordac	Silver Creek	Ag, Pb, Zn

Table 6
Exploration - Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
22	United Keno Hill	MR	Pb, Zn, Ag
23	All-North/Chevron/SMD	MARG	Ag, Cu, Pb, Zn, Au
24	Canamax	HUNDERE	Zn, Pb, Ag
25	Dawson Eldorado	KIWI	Zn
26	Silverquest	PORKER	Au
27	Placer	SURF, BOARD	W
28	Eisenman	SAMOVAR, TEA	Ba
29	Noranda	TES	Au
30	E. Kreft/S. Takacs	GROUSE	Au
31	Hudson Bay	Grew Creek	Au
32	Noranda	LYON, LEN	Au
33	Queenstake	Dublin Gluch	Au
34	Silverquest	SHUT, LIVE	Au
35	Silver Tusk	TINTA	Au, Ag, Pb
36	Noranda	Tatlmán Lake	Au
37	Kerr Addison	SHADOW, KOE, FOG	Au
38	United Keno Hill	RIJ, RUN	Au
39	Kenton	Rusty Springs	Ag, Pb, Zn
a	United Keno Hill	Keno Hill	Ag, Pb
a	Conwest	CARIBOU	Ag, Pb
d	Kerr Addison	EARL	Au
d	Kerr Addison	GLENLIVET	Au
d	Kerr Addison	MAJI	Au
d	Omni	Mount Reid	Au, Ag
f	Shakwak	VESUVIUS HILL	Au
f	Havilak	FOUR F	Au
f	Walhalla	WAL	Au, Ag

Footnotes for Tables 5 and 6

(1) Table location is made with reference to corresponding numbers on Yukon and Northwest Territories maps. Locations are approximate.

(2) Abbreviated name of the Company is used: Expl. (Exploration), JV (Joint Venture).

(3) Geographical areas are indicated by small print, whereas claims and groups are capitalized.

(4) Metal(s) of primary importance defined by chemical symbols: copper (Cu), gold (Au), lead (Pb), tantalum (Ta), lithium (Li), asbestos (Asb), molybdenum (Mo), silver (Ag), barium (Ba), cobalt (Co), tin (Sn), iron (Fe), tungsten (W), niobium (Nb), beryllium (Be), rare earth elements (REE), mercury (Hg), antimony (Sb) and uranium (U).

Table 7
Mineral Production - 1977-1986

Yukon Territory		1977	1978	1979	1980	1981	1982	1983	1984	1985(R)	1986(P)
Mineral											
Gold	\$ g	4 656 118 921 907	8 518 731 1 202 149	13 749 271 1 190 268	63 029 000 2 982 000	66 382 000 3 746 000	39 721 000 2 656 000	50 337 000 3 006 000	44 419 000 2 960 000	42 689 000 3 065 000	65 890 000 4 020 000
Silver	\$ g	20 154 760 127 415 268	28 462 559 143 459 000	54 218 064 129 982 000	114 120 000 147 000 000	32 339 000 80 000 000	29 943 000 95 000 000	6 891 000 15 000 000	18 825 000 54 000 000	13 098 000 47 000 000	16 897 000 66 000 000
Lead	\$ kg	47 627 667 68 621 899	64 322 403 79 233 298	103 374 279 78 250 062	71 558 000 65 771 000	54 935 000 55 970 000	25 733 000 35 493 000	307 000 520 000	1 539 000 2 083 000	848 000 1 470 000	24 436 000 36 279 000
Copper	\$ kg	8 953 814 5 843 210	16 474 354 10 018 826	18 422 058 7 778 231	27 082 000 10 433 000	20 123 000 9 094 000	14 654 000 7 510 000	3 977 000 1 904 000		19 000 10 000	41 000 20 000
Zinc	\$ kg	80 562 287 120 846 637	74 076 827 96 673 141	109 460 866 113 572 783	88 313 000 90 938 000	94 237 000 78 806 000	58 519 000 54 537 000	31 000 27 000	244 000 173 000	137 000 109 000	67 438 000 54 562 000
Bismuth	\$ kg								2 000 162	11 000 1 000	7 000 1 000
Cadmium	\$ kg	11 595 1 670	355 58						6 000 2 000	5 000 1 000	7 000 2 000
Asbestos	\$ t	47 493 872 95 590	26 948 800 53 255								
Sand and Gravel -	\$ t								5 105 000 3 074 000	2 995 000 1 185 000	8 700 000 3 450 000
Sulphur (smelter gas)	\$ t									267 000 2 000	117 000 1 000
Coal	\$ t	322 000 18 779	318 000 16 578	363 000 23 003	287 000 16 529	368 000 20 860					208 000 17 233
Total		\$ 209 460 113	218 804 029	299 244 538	364 389 000	268 016 000	169 120 000	62 987 000	70 143 000	60 069 000	183 741 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.
(P) Preliminary Figures, (R) Revised Figures, (E) Estimated.

Table 8
Mineral Production - 1977-1986

Northwest Territories		1977	1978	1979	1980	1981	1982	1983	1984	1985(R)	1986(P)
Mineral											
Gold	\$ g	31 336 428 6 204 583	45 769 718 6 458 948	61 868 488 5 355 926	96 920 000 4 209 000	85 495 000 4 825 000	91 415 000 6 113 000	144 570 000 8 634 000	191 071 000 12 732 000	177 079 000 12 713 000	219 306 000 13 380 000
Silver	\$ g	18 716 934 118 325 557	23 854 173 120 237 000	34 770 651 83 358 000	41 331 000 53 000 000	13 456 000 33 000 000	16 073 000 51 000 000	33 743 000 74 000 000	20 361 000 59 000 000	9 083 000 33 000 000	5 842 000 23 000 000
Copper	\$ kg	445 850 291 959	518 993 315 624	941 732 397 191	679 000 262 000	613 000 277 000	419 000 215 000	214 000 102 000	130 000 69 000	46 000 23 000	1 000 500
Lead	\$ kg	40 833 313 58 832 599	56 898 673 70 088 814	80 117 935 60 645 969	55 853 000 51 337 000	44 680 000 45 522 000	46 367 000 63 955 000	47 901 000 81 161 000	66 647 000 90 198 000	44 489 000 77 083 000	54 282 000 80 591 000
Zinc	\$ kg	125 104 245 159 709 355	143 911 352 187 809 913	205 600 051 213 323 454	172 556 000 175 685 000	159 764 000 133 604 000	229 110 000 213 523 000	269 951 000 234 883 000	386 813 000 274 920 000	356 415 000 284 223 000	350 476 000 283 557 000
Cadmium	\$ kg	2 677 386						10 000 3 000	1 034 000 214 000	866 000 238 000	639 000 168 000
Bismuth	\$ kg							163 000 32 000	34 000 3 000	60 000 3 000	
Tungsten Trioxide	\$ kg	41 516 000 2 284 409	47 310 800 2 885 619	52 924 000 3 254 067	67 646 000 4 007 000	43 263 000 2 515 000	38 353 000 2 925 000	11 221 000 1 126 000	33 584 000 3 112 000	38 918 000 3 529 000	- 1 786 000
Arsenic Trioxide (E)	\$ t					561 000 1 094	3 862 000 1 780	2 345 000 982	5 837 000 4 684	1 969 000 4 098	- 405
Sulphur (smelter gas)	\$ t									11 665 000 98 000	7 390 000 68 000
Sand and Gravel	\$ t						41 482 000 6 625 000	32 479 000 5 905 000	36 323 000 7 249 000	8 981 000 6 803 000	4 775 000 3 000 000
Stone	\$ t						1 268 000 323 000	14 601 000 2 409 000	4 617 000 729 000	434 000 163 000	900 000 250 000
Total		\$ 257 955 447	318 262 909	436 222 857	434 985 000	347 841 000	468 349 000	557 198 000	746 451 000	649 732 000	656 239 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.
(P) Preliminary Figures, (R) Revised Figures, (E) Estimated.



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Introduction

This report covers mines and mineral activities for the Yukon and Northwest Territories for the calendar year 1987.

The report was written and compiled by D.D. Brown and T.W. Caine of the Mining Resources Section, Ottawa. Sections on mineral exploration are based on exploration overviews produced by regional geological staff under the direction of S. Morison and J.G. Abbott in the Yukon and W.A. Padgham in the Northwest Territories.

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Summary

Northwest Territories

Mineral production in the Northwest Territories (N.W.T.) in 1987 was derived from eight mines, two of which closed during the first half of the year. The Salmita gold mine closed in mid-February and the Pine Point zinc-lead mine closed at the end of June, both because of ore depletion. Canada Tungsten's mine remained closed following suspension of production in mid-1986 because of continuing low tungsten prices.

The value of mineral production shipments was estimated at \$810 million in 1987 compared with \$668 million in the previous year. Much of the production value increase was due to higher metal prices and a substantial increase in zinc and lead production. Zinc and lead accounted for 69 per cent of total mineral production value, and higher output from the Pine Point and Polaris mines resulted in a 13 per cent increase in zinc and lead production from the previous year. Gold production accounted for 28 per cent of total mineral production value, but the closing of the Salmita Mine and other variances caused production to decrease about 6.5 per cent from the previous year.

The mineral industry accounted for 24.6 per cent of the zinc, 34.4 per cent of the lead, 10.0 per cent of the gold and 1.0 per cent of the silver produced in Canada during 1987. The value of these metals combined with byproduct antimony, bismuth and cadmium accounted for 7.2 per cent of Canada's metallic mineral production in 1987 compared with 7.3 per cent in 1986.

Operating mines and mills directly employed an average of 2 110 persons during 1987 compared with 2 406 persons in 1986.

Mineral exploration expenditures were estimated at \$65.5 million in 1987 compared with \$45 million in 1986. Most of the increase was attributable to flow-through share financing. Higher metal prices also stimulated investment.

Of 117 exploration projects conducted in 1987, 102 were directed to gold; the remainder to platinum, base metals, uranium and rare-earth elements.

Yukon

The value of mineral production from Yukon's three year-round mines and other seasonal operations continued to show a remarkable increase. In 1987, mineral production shipments were valued at \$447 million compared with \$176 million in 1986 and \$60 million in 1985. The leading producer, Curragh Resources' Faro Mine, achieved more than a threefold increase in zinc, lead and silver output during its second year of operation, which followed a three-year period of closure. Much of the remaining production increases came from Total Erickson Resources' Mount Skukum gold mine, also in its second year of operation and from the Yukon's numerous seasonal placer gold mining operations. All of the industry was stimulated by higher metal prices.

Gold exploration, supported by flow-through share financing, was again the driving force in mineral exploration and development activity. At year end, development work on Canamax Resources Inc. and Pacific Trans-Ocean Resources Ltd.'s Ketza River gold property was progressing toward a mid-1988 startup. Also, exploration and development work on Omni Resources Inc.'s Skukum Creek property yielded encouraging results and a tonnage/grade combination that could support mine production.

The Yukon's lode (hard-rock) mining industry employed an average of 894 persons directly in 1987 compared with 799 persons a year earlier. In addition, the Yukon placer mining industry employed an estimated 700 persons at approximately 200 operations on a seasonal basis.

The Yukon accounted for 25.7 per cent of the lead, 11.6 per cent of the zinc, 0.5 per cent of the gold and 10.6 per cent of the silver produced in Canada during the year. Also, the Yukon accounted for 4.0 per cent of the value of Canada's metallic mineral production in 1987 compared with 1.8 per cent in 1986.

Mineral exploration expenditures in the Yukon Territory were estimated at \$40 million in 1987 compared with \$27.9 million a year earlier. Much of the increase was attributed to active flow-through share financing. Higher metal prices also encouraged investment. Almost all of the exploration work was directed to precious metals in established exploration areas and much of the work was on known mineral occurrences/deposits.

Sommaire

Territoires du Nord-Ouest

Au cours de l'année civile 1987, la production de minéraux dans les Territoires du Nord-Ouest provenait de huit mines, dont deux ont cessé leurs activités au cours du premier semestre de l'année. La mine d'or Salmita a été fermée à la mi-février et la production de zinc et de plomb à la mine de Pine Point a cessé à la fin de juin, en raison, dans les deux cas, de l'épuisement des réserves de minerai. La mine de la Canada Tungsten est demeurée fermée, par suite de l'arrêt de la production survenu au milieu de 1986, du fait de la stagnation des prix du tungstène.

La valeur des expéditions de minéraux en provenance des Territoires du Nord-Ouest a été évaluée à 810 millions de dollars en 1987, comparativement à 668 millions l'année précédente. Cette progression est due en grande partie à l'augmentation des prix des métaux et à un accroissement considérable de la production de zinc et de plomb. Ces deux derniers métaux représentent 69 p. 100 de la valeur de la production totale de minéraux, et un rendement accru des mines de Pine Point et Polaris a entraîné une augmentation de 13 p. 100 de la production de plomb et de zinc par rapport à l'année précédente. L'or représentait 28 p. 100 de la valeur totale de la production de minéraux, mais la fermeture de la mine Salmita et d'autres variables sont à l'origine d'une baisse de production de 6,5 p. 100 par rapport à 1986.

L'industrie minière des Territoires du Nord-Ouest a fourni 24,6 p. 100 du zinc produit au Canada en 1987, ainsi que 34,4 p. 100 du plomb, 10 p. 100 de l'or et 1,0 p. 100 de l'argent. La valeur de ces métaux, à laquelle il faut ajouter celle des dérivés que constituent l'antimoine, le bismuth et le cadmium, représente 7,2 p. 100 de la production canadienne de minéraux métalliques en 1987, comparativement à 7,3 p. 100 en 1986.

Les mines et les usines métallurgiques dans les Territoires du Nord-Ouest ont employé, dans des emplois directs, en moyenne 2 110 travailleurs en 1987, comparativement à 2 406 en 1986.

Les dépenses relatives à l'exploration minière dans les Territoires du Nord-Ouest ont été estimées à 65,5 millions de dollars en 1987, alors qu'elles étaient de 45 millions l'année précédente. Cet accroissement est en grande partie attribuable

au financement par émission d'actions donnant droit à des dégrèvements d'impôt. Une hausse des prix des métaux a également favorisé les investissements.

Des 117 programmes de prospection menés dans les Territoires du Nord-Ouest en 1987, 102 visaient à trouver de l'or, tandis que les autres avaient trait au platine, aux métaux communs, à l'uranium et aux métaux rares.

Yukon

La valeur de la production de minéraux du Yukon, laquelle production provient de trois mines exploitées à l'année et d'autres sites dont l'exploitation est saisonnière, a continué à montrer une croissance remarquable. En 1987, les expéditions de minéraux étaient évaluées à 447 millions de dollars, comparativement à 176 millions en 1986 et 60 millions en 1985. Le premier producteur, la mine Faro de la Curragh Resources a plus que triplé sa production de zinc, de plomb et d'argent au cours de sa deuxième année d'exploitation, après une période d'inactivité de trois ans. Une large part du restant de l'augmentation de la production a été tirée de la mine d'or Mount Skukum de Total Erickson Resources, elle aussi dans sa seconde année d'exploration, et des nombreux sites saisonniers d'exploitation des alluvions aurifères que compte le Yukon. L'ensemble de l'industrie a été stimulé par une hausse des prix des métaux.

La prospection de l'or, soutenue par le financement par émission d'actions donnant droit à des dégrèvements d'impôt, a été à nouveau l'élément moteur de l'exploration et de la mise en valeur des concessions minières. À la fin de l'année, les travaux de mise en valeur effectués par la Canamax Resources Inc. et la Pacific Trans-Ocean Resources Ltd. sur leur propriété aurifère de la rivière Ketza laissaient prévoir l'ouverture de la mine vers le milieu de 1988. En outre, les travaux de prospection et de mise en valeur, effectués par Omni Resource Inc. sur sa propriété du ruisseau Skukum ont donné des résultats encourageants et révélé une teneur en minerai de bonne valeur qui pourrait permettre l'exploitation du gisement.

L'industrie minière souterraine du Yukon a donné des emplois directs à 894 personnes, en moyenne, en 1987, comparativement à 799 personnes l'année précédente. De plus, l'industrie des sites aurifères

de surface a fourni de l'emploi à environ 700 personnes, réparties dans environ 200 sites, sur une base saisonnière.

Le Yukon a fourni, 25,7 p. 100 du plomb, 11,6 p. 100 du zinc, 0,5 p. 100 de l'or et 10,6 p. 100 de l'argent produits au Canada au cours de l'année. En outre, 4,0 p. 100 de la valeur des minéraux métalliques produits au Canada en 1987 provient du Yukon, comparativement à 1,8 p. 100 l'année précédente.

Les dépenses relatives à la prospection minière dans le territoire du Yukon étaient estimées à 40 millions de dollars en 1987 et à 27,9 millions un an plus tôt. Cet accroissement est dû en grande partie au financement par émission d'actions donnant droit au dégrèvement d'impôt. Une hausse des prix des métaux a également favorisé les investissements. Presque tous les travaux de prospection visaient à trouver des métaux précieux dans des gîtes de prospection bien établis, et une grande partie des travaux ont porté sur des gisements dont l'importance est connue.

Mines and Mineral Activities

Yukon

Mineral Production

The value of mineral production from Yukon's three year-round mines and seasonal operations continued to show a remarkable increase. In 1987 mineral production shipments were valued at \$447 million compared with \$176 million in 1986 and \$60 million in 1985. The leading producer, Curragh Resources' Faro Mine achieved more than a threefold increase in zinc, lead and silver output during its second year of operation which followed a three-year period of closure. Much of the remaining production increases came from Total Erickson Resources' Mount Skukum gold mine, also in its second year of operation and from the Yukon's numerous seasonal placer gold mining operations. All of the industry was stimulated by higher metal prices.

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Mines

Curragh Resources Corp., Faro Mine

The Faro mine (b)* reached a full production rate of 13 500 tpd of ore. The Faro mill processed 4 539 394 t of ore to recover 184 727 t of zinc, 121 539 t of lead, and 109 202 kg of silver and 384.4 kg of gold in zinc and lead concentrates. All of the ore processed was from the Faro open pit mine. Because the Faro deposit will be exhausted within four years, the company is conducting early development work on the Vangorda and Grum deposits 14 to 16 km southeast of the Faro mill complex. The Grum, with reserves of about 40 million t grading 9 per cent combined zinc-lead, is slated for production as the Faro Mine is phased out.

Type:	Open pit
Location:	13 km north of Faro
Product:	Zinc, lead, silver
Mill Capacity:	13 500 tpd
Tonnes Milled:	4 539 394 t
Reserves:	15 million t (December 31, 1987)
Reserve Grade:	3.37% lead, 4.69% zinc, 45 g/t silver
Employees:	475

Total Erickson Resources Ltd., Mount Skukum Mine

The Mount Skukum gold mine (d) is operated by Mount Skukum Gold Mining Corporation (a totally-owned subsidiary of Total Erickson Resources), which owns 37 per cent of the mine. AGIP Canada Ltd. owns the remaining 63 per cent interest in the mine.

In 1987, the Mount Skukum mill processed 97 031 t of ore grading 15.39 g/t of gold that was mined underground in the Main zone vein. Recovery amounted to 1 378.5 kg of gold and 1 067 kg of silver. A development adit was driven to the Brandy and Lake zone veins, which have combined reserves of 94 990 t grading 16 g/t of gold. Extensive exploration was conducted on the property to prove new reserves.

* Numbers or letters in parenthesis indicate the location of the property on the map near the centrefold.

Type:	Underground
Location:	90 km southwest of Whitehorse
Product:	Gold, silver
Mill Capacity:	270 tpd
Tonnes Milled:	97 031 t
Reserves:	202 392 t (February 1988)
Reserve Grade:	10.66 g/t gold (cut)
Employees:	90

Table 1:
Mineral Production of Operating Mines in the Yukon, 1985, 1986 and 1987 and Employment, 1987

Company, Mine and Commodity	1985 t	kg	1986 t	kg	1987(P) t	kg	Number of Employees
<i>Curragh Resources Corp.</i>							
Faro Mine							
zinc	-		62 951		226 266		475
lead	-		38 204		149 285		
silver		-		42 753		177 025	
<i>Dawson Eldorado Mines Ltd.</i>							
Plata-Inca							10
silver		9 330		1 244		857	
lead	1 360		N/A		48.4		
zinc	N/A		N/A		4.6		
<i>Nadahini Mining Corporation</i>							
Whiskey Lake							8
coal	-		17 233		20 000		
<i>Total Erickson Resources Ltd.</i>							
Mount Skukum							
gold		-		933		1 379	90
silver		-		715		1 068	
<i>United Keno Hill Mines Ltd.</i>							
Elsa area mines							196
silver		39 585		53 187		46 437	
lead	975		1 355		1 605		
zinc	-		66		385		
<i>Whitehorse Coal Corporation</i>							
coal	-		1 800		-		-
TOTAL							779

Source:
Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

N/A Not available
(P) Preliminary
- Nil

United Keno Hill Mines Limited, Elsa Area Mines

In 1987, United Keno Hill Mines (a) extracted silver ore from six underground mines and five open-pit mines. Although the tonnage milled was up seven per cent to 78 833 t, production of silver in concentrate was down 15 per cent to 46 437 kg compared with 1986. The drop in silver production was due to a decrease in mill head grade from the previous year. During the year, shaft sinking was in progress to develop an ore zone in the Husky Southwest Mine and exploration adits and ramps were driven in other mine areas. Considerable exploration and development was conducted to increase ore reserves.

Type:	Underground and open pit
Location:	Keno Hill - Galena Hill areas, near Elsa
Product:	Silver
Mill Capacity:	450 tpd
Tonnes Milled:	78 833 t
Reserves:	172 455 t (December 31, 1987)
Reserve Grade:	1 042 g/t silver, 5.4% lead
Employees:	196

Small Seasonal Mine Operations

Dawson Eldorado Mines Ltd., Plata-Inca Mine

In 1987, the company mined 114 t of direct-shipping, silver-lead ore averaging approximately 6 900 g/t of silver from the Plata P-6 and Plata P-4 veins on the Plata-Inca property (c). Shipments amounted to 747 kg of silver, 48.4 t of lead, 4.6 t of zinc and 670 g of gold. Since 1987, the company has mined the property during the summer months and has transported the ore by air from the property to Ross River, 130 km to the south for shipment by truck to smelter.

Nadahini Mining Corporation, Whiskey Lake Mine

The company mined the small open-pit Whiskey Lake coal property (e), located west of Ross River, under an agreement with Curragh Resources Corp. to provide the Faro mill with thermal coal. The coal is used to feed the zinc-lead concentrate drier at the Faro mill. In 1987, Nadahini produced approximately 20 000 t of bituminous coal.

Placer Mining

Placer mine gold production in the Yukon Territory, based on royalty payments, amounted to 4 136 kg of raw gold or approximately 3 300 kg of fine gold compared with 2 878 kg of fine gold a year previously. This was the highest annual production on record since 1917. The value of this production is estimated at \$64.3 million. About 200 operations were active and all of the traditional mining areas produced during the year. Most of the production came from the Klondike (3), Indian River (4) and Sixtymile River (2) areas.

Among the larger producers, Queenstake Resources Ltd. operated a dredge on Clear Creek (5) and bulldozer-trommel-sluice box operations on Maisy May and Black Hills creeks (4). The dredging operation, the last of its kind in the Yukon, was closed down permanently at the end of the operating season because it proved to be uneconomical. Recovery from the three operations amounted to 148.5 kg of fine gold.

Granville Joint Venture operated by Teck Corporation began production on Gold Creek in the Klondike area (3) and sluiced 101 700 cubic m of pay gravel to recover 208.2 kg of crude gold.

Underground mines were worked during the 1986/87 winter season. White Channel Underground Mining Ltd. mined 65 000 bank cubic m of pay gravel at Jackson Hill in the Klondike area (3). Klondike Underground Mining at Miller Creek in the Sixtymile area (2) spent part of the 1986/87 winter driving a new adit. The company mined 5 000 cubic m of pay gravel and waste. A third underground operator, Miben Mining, on the south side of Dago Hill, in the Klondike area (3), mined 126 000 cubic m of pay gravel.

At the close of 1987, there were 15 123 placer claims in good standing compared with 14 701 in 1986. There were also 409 placer leases to prospect in good standing compared with 225 in 1986. A total of 1 855 new placer claims were staked and 363 new placer leases were staked during 1987.

Development

Major development was conducted on the Ketza River gold property (24) of Canamax Resources Inc. and Pacific Trans-Ocean Resources Ltd. in preparation for initial mine production in 1988. Also, Omni Resources Inc. advanced its exploration/development program on its Skukum Creek gold property (d) in an effort to bring the project to mine-feasibility and production-decision stages.

Ketza Project

At year-end, construction of a 320 tpd mill on the Ketza property was proceeding for completion in early 1988 and initial production before mid-1988. Since 1984, the joint venture developers, Canamax and Pacific Trans-Ocean have invested some \$24.5 million in the project. The mine is expected to produce 1 550 kg of gold annually, create 109 new jobs and extend over a mine life of 4.5 years based on year-end 1987 reserves. Reserves of oxide-type gold ore amount to 454 000 t averaging 18 g/t of gold in the Peel and Ridge zones and a possible 75 000 t averaging 13 g/t of gold in the Break zone.

Skukum Creek Project

Omni Resources Inc. conducted a \$2-million exploration/development program on its Skukum Creek property (d) in the Mount Skukum area. Exploration work included 869 m of lateral workings on the 1 300 m level, underground and surface drilling and bulk sampling. Preliminary metallurgical tests yielded encouraging results. At year end 1987, drill proven reserves of the Rainbow vein and nearby Kuhn vein amounted to 745 000 t grading 7.71 g/t of gold and 387.2 g/t of silver. The company will continue underground development and bulk sampling through the winter of 1987/1988 as part of feasibility study work. A decision on mine production is expected in 1988.

Mineral Exploration

Mineral exploration expenditures in the Yukon Territory were estimated at \$40 million in 1987 compared with \$27.9 million a year earlier. Much of the increase was attributed to active flow-through share financing. Higher metal prices also encouraged investment. Almost all of the exploration work was directed to precious metals in established exploration areas and much of the work was on known mineral occurrences/deposits.

Table 2
Quartz Claims Recorded in Yukon, 1986 and 1987

Mining District	Claims Recorded	Claims Recorded
	1986	1987
Whitehorse	2 494	6 002
Dawson	568	2 464
Mayo	310	558
Watson Lake	2 644	3 544
Total	6 016	12 568

Exploration Projects

Wheaton River - Montana Mountain Areas

Exploration in the area continued to be active and directed to epithermal gold- and silver-bearing quartz carbonate veins and breccias associated with Cretaceous and early Tertiary volcanic and related intrusive rocks.

Omni Resources Inc. increased the reserves on its Skukum Creek property (d) to 745 000 t grading 7.7 g/t of gold and 307.2 g/t of silver by both surface and underground drilling and underground development on the Rainbow and Kuhn zones (see Development).

Total Erickson Resources Ltd., in joint venture with AGIP Canada Ltd., conducted a \$2.3 million exploration program on their Mt. Skukum Mine property (d) and increased the drill indicated reserves in the Brandy and Lake zones. Some 7 800 m of drilling were completed and various geophysical surveys outlined exploration targets for the 1988 program.

At least 13 other projects in the district were conducted by Omni Resources Inc., Berglynn Resources Ltd., United Keno Hill Mines Ltd., All-North Resources Ltd., Kerr Addison Mines Ltd., Pacific Trans-Ocean Resources Ltd. and Sirius Resources Ltd.

Dawson Range

Exploration for gold and silver veins was active in the Dawson Range with five drill programs and extensive trenching near Mt. Nansen, on Mt. Freegold and along Big Creek (12). Chevron Minerals Ltd. and BYG Natural Resources Ltd. drilled 17 holes totalling 1 048 m on the Flex and Webber zones on the Mt. Nansen property (13). On the nearby Brown-McDade zones, geological reserves amount to 727 000 t of oxidized material grading 7.9 g/t of gold and 62 to 103 g/t of silver. A new gold-silver bearing zone, named the Dickson, was identified during the year between the Brown-McDade zone and the Flex zone.

Also in the Mt. Nansen area, Chesbar Resources Inc. and States Exploration Ltd. reported a drill intersection of 14.7 g/t of gold over 1.6 m from the VIC property (13), optioned from Kerr Addison Mines Ltd. Approximately 1 219 m of drilling were completed.

Aurchem Exploration Ltd. drilled approximately 1 524 m on the Goulter property (13) where gold-bearing quartz veins cut Cretaceous intrusives and metamorphic rocks.

On Mt. Freegold, Nordac Mining Corp. trenched the ANTONIUK and GOLDSTAR properties (12). On the GOLDSTAR property, a trench on the Margarete vein was reported to yield assays of 9.77 g/t of gold and 96.0 g/t of silver. Also, near Mt. Freegold, Noranda Exploration Co. Ltd. trenched and drilled 185 m on the EMMON'S HILL property (12). The company also trenched over 252 m on the PINESOL property (12), optioned from G. Lee. Dominion Explorers trenched the GOLDY occurrence (12). Shawkaw Exploration Company Limited drilled the faulted extension of the LAFORMA vein (12).

Along the west side of Big Creek, Nordac Mining Corp. conducted extensive bulldozer trenching on the REVENUE and NUCLEUS properties (12). Values of 1.6 g/t of gold over 70 m were obtained in one trench northwest of Big Creek. Noranda Exploration Co. Ltd. conducted a VLF-EM survey, drilling and bulldozer trenching on the TAD property (10).

Klondike District

In the Klondike gold fields, near Dawson, gold-bearing quartz veins in the Klondike Schist were the target of exploration along Bonanza and Hunker creeks.

Mark Management explored the LONE STAR property (3) by completing approximately 9 296 m of rotary and diamond drilling, bulldozer trenching and extensive sampling. United Keno Hill Mines Ltd. explored a zone on the HUNK property (4), by resampling the BEN LEVY adit, conducting geophysical and geochemical surveys and bulldozer trenching. Trenching on one of the geochemical anomalies exposed en echelon quartz veins. Values of up to 29.5 g/t of gold over 4 m were reported from this zone. A total of 25 discrete veins were identified with samples averaging 3 to 15.5 g/t of gold.

Ketza-Seagull District

Gold and silver occur in sulphide-oxide replacement deposits in limestone and dolomite and in fissure veins and breccia zones. The deposits are zoned about two domal uplifts namely the Ketza and Seagull uplifts.

In the Ketza Uplift, Canamax Resources Ltd. and Pacific Trans-Ocean Resources Ltd. carried out extensive geophysical surveys, detailed geochemical surveys and 10 021 m of drilling over nine gold-silver mineralized zones on their jointly-held Ketza River property (24) and other properties in the area. Several new oxide and sulphide showings were discovered. The drill program encountered high-grade mineralization from an oxidized unit in the Knoll zone. On the Gully and QB zones, oxide reserves of 64 950 t grading 9.6 g/t of gold were identified. The reserves of the Break zone and the main deposits of the Ketza River Property, the Peel and Ridge zones, are given in this report under "Development".

Other companies active in the Ketza Uplift area were Golden Pavilion Resources Ltd. (SONNY property) and Mountain Province Mining Inc. (WHITE, EROS properties).

In the Seagull Uplift area (23), Fairfield Minerals Ltd. conducted geophysical surveys for gold on the RAM property and Yukon Minerals Corp. trenched small high-grade silver veins at the head of Groundhog Creek. Cominco Ltd. also drilled 11 holes totalling 961 m on the TAY(LP) property.

Keno Hill District

United Keno Hill Mines Ltd. tested seven target areas on its mine property (a) by drilling 185 rotary-percussion overburden holes totalling 8 113 m. Exploration adits and drifts and raises were driven on the Bellekeno, Lucky Queen, Silver Queen, Ruby and Husky veins. Underground drilling on the Bellekeno and Silver King exploration adits amounted to 846 m. A significant new deposit was identified in the Bellekeno Mine.

Northeast of Keno Hill, on the CLARK property (7), Archer Cathro and Associates (1981) Ltd. working for NDU Resources Ltd., drilled a silver-lead-zinc bearing mantos deposit. Mineralization, in five of the six holes drilled, averaged 273 g/t of silver, 6.5 per cent lead and 9.3 per cent zinc over 1.8 m.

Hess River Area

Dawson Eldorado Mines Ltd. and Pacific Trans-Ocean Resources Ltd. drilled 15 holes on the PLATA P-4 vein (c) and outlined possible geological reserves of 450 000 t of silver-gold mineralization at depths of less than 60 m.

Southeast Yukon

Northeast of Watson Lake, seven holes totalling 2 012 m were drilled by Novamin Resources Inc. to increase the geological reserves of the MEL barite-zinc-lead deposit (32) to 5.58 million t grading 6.63 per cent zinc, 1.92 per cent lead and 49.6 per cent barite.

At its Mt. Hundere property (30), Canamax Resources Inc. drilled 14 holes totalling 3 890 m and increased the tonnage and grade of the zinc-lead-silver resources. A new zone containing some 500 000 t of inferred reserves was located 500 m northeast of the south showing, where 2.2 million t grading 14.1 per cent zinc, 8.7 per cent lead and 72 g/t of silver had been indicated at the beginning of the year. So far, five significant mineralized zones have been discovered by Canamax.

Near Quartz Lake, Novamin Resources Inc. and NDU Resources Ltd., under an option agreement with Silverquest Resources Ltd., trenched gold geochemical anomalies on the PORKER property (31). One oxidized zone returned assays as high as 4.1 g/t gold over 6.1 m.

Rancheria District

Silver-bearing veins and mantos deposits are associated with northeast-trenching faults and early Tertiary dykes in the district. On the LOGAN property (28), a fault zone cuts a highly altered Cretaceous intrusion and contains mineralized veins and breccia zones. Fairfield Minerals Ltd. and Getty Resources Ltd. completed a 44-hole, 7 620-m drill program, to further define the Main zinc-zinc-silver deposit. Reserves were increased substantially and were estimated at 13.97 million t grading 5.13 per cent zinc and 20.2 g/t of silver.

Silver Hart Mines Ltd. continued drilling from the previous year on the TM zone on the CMC (Hart) property (26). The company increased its geological reserves to 97 000 t grading 1 025 g/t of silver.

Pak-Man Resources Ltd. and 2001 Resources Industries Ltd. trenched several prospects in Rancheria District (27).

Tintina Trench

Near Ross River, Golden Nevada Resources Inc. and Noranda Exploration Company conducted geochemical and airborne geophysical and airborne geophysical surveys over the Grew Creek property (18), in search for epithermal gold-bearing deposits, which cut Tertiary volcanic rocks on the property. The Main deposit, which had previously been explored by drilling, was retested by diamond drilling. The best hole, Hole No. 30, intersected 31.5 m grading 11.66 g/t of gold and 150.9 g/t of silver.


Kluane Ranges

The Kluane Joint Venture, comprised of All North Resources Ltd., Galactic Resources Ltd. and Chevron Minerals Ltd. continued exploration on the WELLGREEN (QUILL) mine property (35). The property was under option from Hudson-Yukon Mining Corp. Bulldozer trenching, geophysical surveying and 4 932 m of diamond drilling in 45 holes showed a widespread but erratic distribution of platinum-palladium-copper-nickel-cobalt values. The platinum-bearing disseminated and massive sulphide mineralization are associated with a mafic-ultramafic Triassic differentiated sill and adjacent footwall rocks.


Rockridge Mining Corp., Chevron Minerals Ltd. and All North Resources Ltd. conducted a geophysical survey and completed 603 m of drilling to test the contact of an ultramafic sill on the CANALASK property (36). No significant mineralization was reported. Similar ultramafic sills were explored for platinum group metals in the area by Silverquest Resources on the WALSH property (36), by 2001 Resources and Rockridge Mining on the LINDA (KLU) property (35), by Rockridge Mining Corp. on the DUKE property (34) and by Pak-Man Resources and Rockridge Mining on the AIRWAYS property (16).

YUKON MINERAL EXPLORATION AND MINING - 1987

LEGEND


 Producing Hardrock Mine


- a United Keno Hill Mines Ltd., Ag, Pb, Zn, Cd
Dawson Eldorado Mines Ltd., Ag, Pb
Springmount Operating Co. Ltd., Ag, Pb
- b Curragh Resources Corp., Pb, Zn, Ag
- c Dawson Eldorado Mines Ltd., Ag, Pb
- d Total Erickson Resources Ltd., Au
- e Nadahini Mining Corp., Coal

 Areas of Mineral Exploration Activity
Refer to Yukon Table and Text

 LEAD-ZINC-SILVER

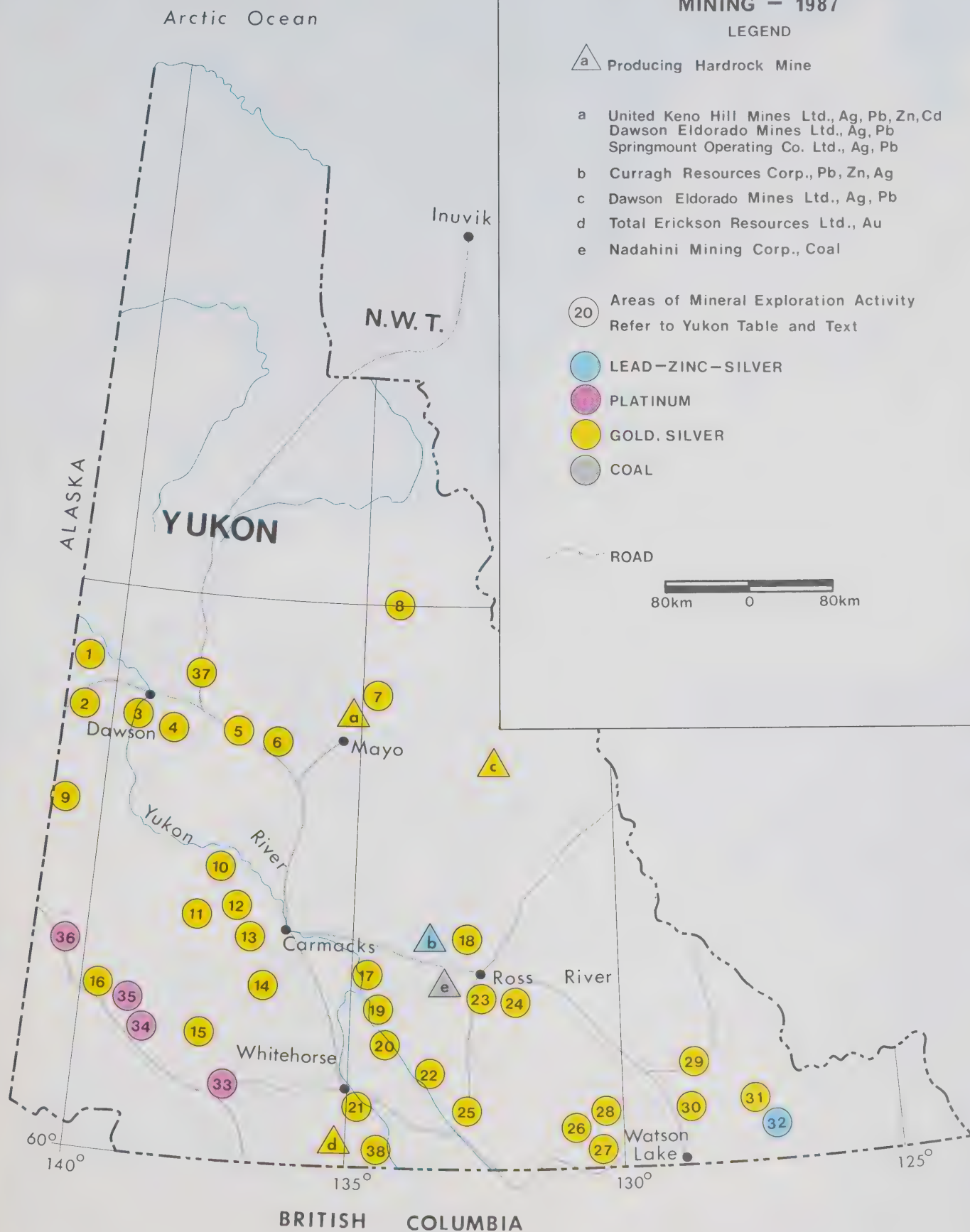
 PLATINUM

 GOLD, SILVER

 COAL

 ROAD

 80km 0 80km





MINERAL EXPLORATION AND MINING NORTHWEST TERRITORIES — 1987

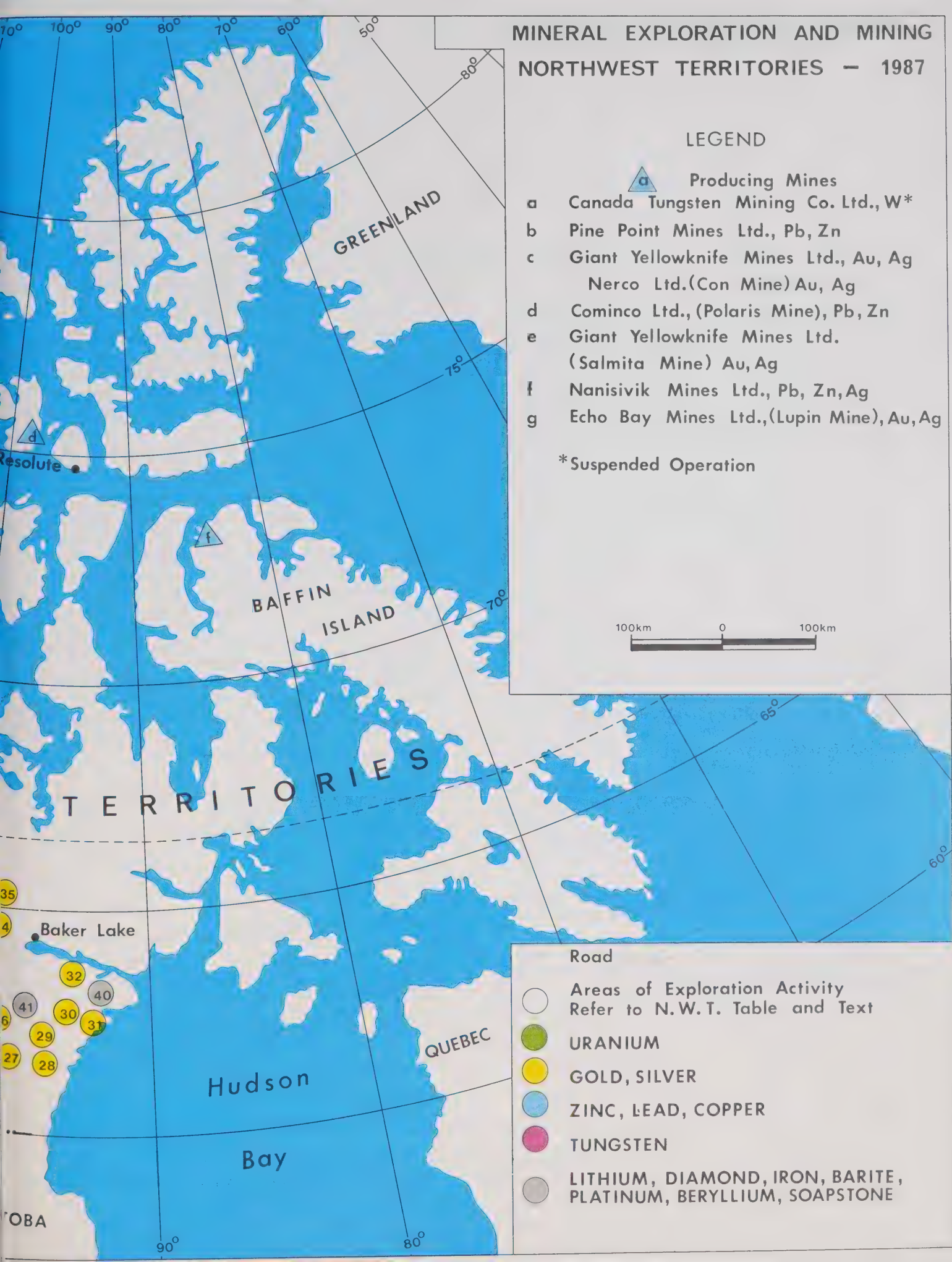
LEGEND



Producing Mines

- a Canada Tungsten Mining Co. Ltd., W*
- b Pine Point Mines Ltd., Pb, Zn
- c Giant Yellowknife Mines Ltd., Au, Ag
Nerco Ltd.(Con Mine) Au, Ag
- d Cominco Ltd., (Polaris Mine), Pb, Zn
- e Giant Yellowknife Mines Ltd.
(Salmita Mine) Au, Ag
- f Nanisivik Mines Ltd., Pb, Zn, Ag
- g Echo Bay Mines Ltd., (Lupin Mine), Au, Ag

*Suspended Operation



Mines and Mineral Activities

Northwest Territories

Mineral Production

Mineral production in the Northwest Territories in 1987 was derived from eight mines, two of which closed during the first half of the year. The Salmita gold mine closed in mid-February and the Pine Point zinc-lead mine closed at the end of June, both because of ore depletion. Canada Tungsten's mine remained closed following suspension of production in mid-1986 because of continuing low tungsten prices.

The value of mineral production shipments in the N.W.T. was estimated at \$810 million in 1987 compared with \$668 million in the previous year. Much of the production value increase was due to higher metal prices and a substantial increase in zinc and lead production. Zinc and lead accounted for 69 per cent of total mineral production value. Higher output from the Pine Point and Polaris mines resulted in a 13 per cent increase in zinc and lead production from the previous year. Gold production accounted for 28 per cent of total mineral production value, but the closing of the Salmita Mine and other variances caused production to decrease about 6.5 per cent from the previous year.

The mineral industry in the N.W.T. accounted for 24.6 per cent of the zinc, 34.4 per cent of the lead, 10.0 per cent of the gold and 1.0 per cent of the silver produced in Canada during 1987. The value of these metals combined with byproduct antimony, bismuth and cadmium accounted for 7.2 per cent of Canada's metallic mineral production in 1987 compared with 7.3 per cent in 1986.

Operating mines and mills in the N.W.T. directly employed an average of 2 110 persons during 1987 compared with 2 406 persons in 1986.

Mines

Canada Tungsten Mining Corporation Limited, Cantung Mine

Canada Tungsten owns the western world's largest tungsten operation, the Cantung Mine, at Tungsten, N.W.T. (a)*. The mine remained on a care and maintenance basis throughout the year as world tungsten prices were too low for its economic operation.

Cominco Ltd., Polaris Mine

In 1987, the mill of the Polaris Mine (d) treated a record 983 800 t grading 13.6 per cent zinc and 3 per cent lead to produce 206 100 t of zinc concentrate and 33 600 t of lead concentrate. The metal contained in the concentrate amounted to approximately 131 000 t of zinc and 27 000 t of lead.

Although ice conditions were difficult during much of the marine navigation season, particularly between Resolute and the Polaris Mine, 14 shiploads were required to carry the bulk concentrates to markets. Recognition of probable ore losses in stope pillars resulted in a downward adjustment of reserves from the previous year.

Type:	Underground
Location:	The Polaris Mine is on Little Cornwallis Island, 100 km north-west of Resolute.
Product:	Zinc, lead
Mill Capacity:	2 100 tpd
Tonnes Milled:	983 800 t
Reserves:	15.059 million t (December 31, 1987)
Grade:	14.4% zinc and 3.9% lead
Employees:	261

* Numbers or letters in parentheses indicate the location of the property on the map in the centrefold

Table 3:
Mineral Production of Operating Mines in the Northwest Territories, 1985, 1986 and 1987 and
Employment, 1987

Company, Mine and Commodity	1985		1986		1987(P)		Number of Employees
	t	kg	t	kg	t	kg	
<i>Canada Tungsten Mining Corporation Limited</i>							
tungsten trioxide	3 717		1 782		Nil*		Nil
<i>Cominco Ltd.</i>							
Polaris Mine							
zinc	117 804		114 000		131 000		261
lead	39 300		25 000		27 000		
<i>Echo Bay Mines</i>							
Lupin Mine							
gold		6 069		6 009		6 006	467
silver		1 186		995		882	
<i>Giant Yellowknife Mines Ltd.</i>							
Giant Mine							
gold		2 030		1 993		2 380	396
silver		568		767		?	
arsenic trioxide	2 055		405.5		N/A		
<i>Salmita Mine</i>							48
gold		1 981		1 529		545	
silver		360		247		114	
<i>Nanisivik Mines Ltd.</i>							
zinc	60 956		60 241		57 900		194
lead	5 144		3 528		2 500		
silver		23 512		25 372		23 000	
<i>Nerco Con Mine Ltd.</i>							415
Con Mine							
gold		2 427		2 777		2 576	
silver		633		574		622	
arsenic trioxide	1.1		Nil		Nil		
<i>Pine Point Mines Ltd.</i>	161 379		238 625		287 683		303
lead	56 174		109 815		114 185		
<i>Treminco Resources Ltd.</i>							
gold				72		102.2	26
silver						10	
						TOTAL	2 110

Source:
Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figure which are based on metals sold or shipped.

N/A: Not available
(P): Preliminary
* Mine closed

Echo Bay Mines Ltd., Lupin Mine

The mill at the Lupin Mine (g) processed 1 686 t of ore per day with an average grade of 10.3 g per t of gold, for an output of 6 006 kg of gold compared with 1 617 t per day averaging 10.7 g per t and an output of 6 009 kg a year earlier. In 1988, the company plans to continue its shaft-deepening program from a depth of 778 m to 945 m.

Type:	Underground
Location:	400 km northeast of Yellowknife
Product:	Gold
Mill Capacity:	1 600 tpd
Tonnes Milled:	616 886 t
Reserves:	3.4 million t (December 31, 1987)
Reserve Grade:	11.38 g/t gold
Employees:	467

Giant Yellowknife Mines Ltd., Giant Mine

The mill at the Giant Mine (c), near Yellowknife, processed 338 655 t of ore averaging 8.09 g of gold per t for an output of 2 379.9 kg of gold compared with 1 993 kg of gold in the prior year from the treatment of 292 167 t of ore. Some 66 per cent of the ore was mined from underground workings and 34 per cent was from open pits.

A pilot plant was built and operated to determine the feasibility of treating old mine tailings for gold recovery. As a consequence, the company decided to construct a \$24.6 million full scale plant and new tailings disposal area. The tailings treatment plant is expected to be operational in mid-1988 and will be capable of producing 1 150 kg of gold per year.

Type:	Underground with small open pits on surface
Location:	2.4 km north of Yellowknife
Product:	Gold
Mill Capacity:	1 000 tpd
Tonnes Milled:	338 655 t
Reserves:	2.35 million t (December 31, 1987)
Reserve Grade:	8.52 g/t gold
Employees:	396

Giant Yellowknife Mines Ltd., Salmita Mine

Salmita Mine (e) production was 2 154 t of ore grading 26.2 g of gold per t for an output of 545.4 kg of gold compared with 63 380 t of ore grading at 25.1 g of gold per t and 1 528.5 kg of gold a year earlier. The mine's reserves were exhausted early in 1987 and the workings were allowed to flood. Over the 3.5 year mine life, total production was 5 595 kg of gold.

A pilot plant bioleach test was undertaken at the Salmita mill site on refractory ore from the Red 24 claim, located a few miles north of the mill. During the summer 473 t of ore grading 25.2 g of gold per t were processed.

Type:	Underground
Location:	256 km northeast of Yellowknife
Product:	Gold
Tonnes Milled:	2 154 t
Mill Capacity:	145 tpd
Reserves:	Nil (December 31, 1987)
Reserve Grade:	None
Employees:	48

Nanisivik Mines Ltd., Nanisivik Mine

Production at Nanisivik (f) in 1987 amounted to 680 000 t of ore grading 9.0 per cent zinc and 0.6 per cent lead and 41 g/t of silver resulting in an output of 57 900 t of zinc (in 103 400 t of concentrate), 2 500 t of lead (in 4 500 t of concentrate) and 23 000 kg of silver. During the Arctic marine navigation season, July to September, five bulk shipments of concentrate were made with most of the concentrates continuing to be shipped to Europe.

Type:	Underground
Location:	27 km east of Arctic Bay, Baffin Island
Product:	Zinc, lead, silver
Mill Capacity:	2 000 tpd
Tonnes Milled:	680 000 t
Reserves:	2.57 million t (December 31, 1987)
Reserve Grade:	10% zinc, 0.3% lead, 45 g/t silver
Employees:	194

Nerco Inc., Con Mine

The Con Mine (c) produced approximately 2 576 kg of gold and 515 kg of silver in 1987. The company is planning to build a new production headframe on the C1-B3 shaft to gain working access to new reserves identified during the year in the C1-B3 mine workings. Reserves were increased by 11 600 kg of gold.

Type:	Underground
Location:	1.4 km south of Yellowknife
Product:	Gold, silver
Mill Capacity:	675 tpd
Tonnes Milled:	Approximately 192 000 t
Reserves:	2.26 million t (December 31, 1987)
Reserve Grade:	10.42 g/t gold
Employees:	415

Pine Point Mines Limited, Pine Point Mine

The mill at the Pine Point Mine (b) processed 3 187 900 t of ore to produce 483 500 t of zinc concentrate (287 683 t of zinc) and 148 100 t of lead concentrate (114 185 t of lead). The zinc concentrate output was a record because of higher average zinc mill-feed grade than in 1986 but lead concentrate output was lower because of lower lead mill feed grade. Mining operations ceased in June 1987 because ore reserves were almost totally exhausted leaving an ore stockpile for mill processing. The mill continued to operate at maximum rates until April 6, 1988, when the ore stockpile was exhausted. Reclamation and abandonment work in the mine area and Pine Point townsite were scheduled for 1988.

Type:	Open pit
Location:	Pine Point
Product:	Zinc, lead
Mill Capacity:	9 100 tpd
Tonnes Milled:	3 187 900 t
Reserves:	750 000 t (Dec. 31, 1987)
Reserve Grade:	10.4% zinc, 3.4% lead
Employees:	303

Tremanco Resources Limited

Tremanco continued to mine from its Tom gold mine and truck the ore to Giant Yellowknife's mill for custom processing. Tremanco purchased the neighbouring Ptarmigan Mine from Cominco Ltd. in July and placed it into production in September. Reserves in the Ptarmigan are estimated at 126 099 t grading 13 g/t gold.

Type:	Underground
Location:	20 km east of Yellowknife
Product:	Gold, silver
Mill Capacity:	Nil
Tonnes Milled:	12 637 t
Reserves:	126 099 t (Dec. 31, 1987)
Reserve Grade:	13 g/t gold
Employees:	26

Development

Giant Yellowknife Mines Ltd. announced that it will spend \$24.6 million to construct a tailings retreatment plant and related facilities to treat 6.3 million t of tailings grading 2.23 g/t of gold at its Giant Mine (c).

Neptune Resources Corp. completed a demonstration leach project on its Colomac Lake gold property (7) by leaching a 1 350 t bulk sample assaying 3.09 g/t of gold. In December, the company announced that it was proceeding to make financial arrangements for a 9 000 tpd open-pit mine and related mill facilities for the mining and processing of 14.5 million t grading 2.2 g/t of gold.

At year end 1987, Noranda Explorations Co. Ltd. and Getty Resources Ltd. announced a two-year, \$33-million underground exploration program designed to confirm the continuity, mineability and economic viability of their Tundra gold deposit (e). The program will entail sinking a 475 m vertical shaft, drifting, underground drilling and raising in ore to obtain bulk samples.

Mineral Exploration

Mineral exploration expenditures in the N.W.T. were estimated at \$65.5 million in 1987 compared with \$45 million in 1986. Most of the increase was attributable to flow-through share financing. Higher metal prices also stimulated investment.

Of 117 exploration projects conducted in the N.W.T. in 1987, 102 were directed to gold; the remainder to platinum, base metals, uranium and rare-earth elements. Exploration expenditures for gold probably exceeded \$56 million with most of the activity, some 98 projects, being concentrated in Slave Province (extending between Great Slave Lake and Coronation Gulf) and in the Archean greenstone belts in Keewatin District. Base metal exploration was confined mainly to areas around producing zinc-lead mines namely the Pine Point, Nanisivik and Polaris mines. Urangesellschaft Canada Ltd. continued work in Keewatin District, where the Kiggavik (formerly Lone Gull) property absorbed most of the exploration expenditures in the N.W.T. for uranium. A number of companies explored for platinum group metals.

Table 4
Claims Recorded in the Northwest Territories,
1986 and 1987

Mining District	1986		1987	
	Number of Claims	Area (hectares)	Number of Claims	Area (hectares)
Mackenzie Arctic and Hudson Bay	449	291 202	120	76 674
Nahanni	82	69 160	1	627
	0	0	0	0
Total	531	360 362	121	77 301

Exploration Projects

Gold Exploration in Slave Province

Courageous Lake Area

The largest gold exploration project was conducted by Noranda Exploration and Getty Resources on the Fat zone on the Tundra property (e) at a cost of more than \$8 million. Deep drilling in 1987 confirmed the presence of ore grade material to vertical depths of as much as 1 460 m. This altered felsic-volcanic shear-zone gold deposit extends over a strike length of 1 450 m. Surface diamond drilling in 1987 amounted to approximately 36 500 m. At year end, possible undiluted geological reserves amounted to 23.9 million t grading 6.17 g/t of gold, including 8.44 million t grading 8.91 g/t of gold. The underground exploration and development program planned for 1988 is described in this report under "Development".

The encouraging results on the Tundra property resulted in 11 other exploration projects on the Courageous Lake volcanic belt, nine of which involved drilling. Bow Valley Industries Ltd. and Hemisphere Development Corp. drilled along a 14-km segment of the belt adjoining the Tundra property and encountered anomalous gold values. Immediately south of the Tundra property (e), Giant Yellowknife Mines Ltd. drilled in the vicinity of the Salmita Mine and on nearby properties. Farther to the south, Bow Valley Industries Ltd. drilled on the BS claims (e) and Highwood Resources Ltd. drilled on the NOD claims.

To the north of the Tundra property (e), drill programs were carried out by Aber Resources Ltd. on the JAX property and by Colray Resources Inc. and Claude Resources on the MIST and BULLY claims. Gunnar Gold Inc. and Mill City Gold Corp. acquired the MOG claim group, adjoining the Tundra property to the northwest, and conducted geological and geophysical surveys. Noranda Exploration Co. Ltd. conducted geophysical surveys on the INKA and BERTHA claims and Goldplex Development Corporation mapped the LAVA claim near Jax Lake.

Indin Lake Area

As the leading project in the Indin Lake area, Neptune Resources Corp. completed 125 diamond drill holes totalling 9 725 m on its Colomac and Goldcrest claim groups (7). The \$5.5 million program included drilling, mining of a 36 000 t bulk sample and processing 3 500 t of crushed material in a demonstration open vat leach facility. The company's plan to develop the property is described in this report under "Development".

Echo Bay Mines Ltd. completed two exploration projects in the Indin Lake area (7) on properties held in joint venture with Comaplex Resources International Ltd. and Petromet Resources Ltd. Drilling on the KIM claims focused on the Cass gold zone. At the north end of Indin Lake, joint ventures partners, Mahogany Resources Inc. and Treasure Island Resources Corporation drilled the Spider Lake property (7). Other projects in the Indin Lake area were drilled by Tanqueray Exploration, Comaplex Resources and Stratabound Minerals Corporation.

Yellowknife Volcanic Belt

At the north end of the belt (7), on the Clan Lake area, Canamax Resources Inc. drilled the NOSE claims and Noranda Exploration Co. Ltd. explored the BOSS and BELL claims. Also, Troymin Resources Ltd., in joint venture with Coronado Resources, drilled 1 300 m on the MON and DIS claims.

In the Yellowknife area (c), Giant Yellowknife Mines Ltd. completed over 3 000 m of surface drilling on its leases. To the south of Yellowknife, Golden Marlin Mines Ltd. continued ice-platform drilling to test indicated shear zones under the waters of Yellowknife Bay.

Russell-Slemon Lake Area

Aber Resources Ltd., in joint venture with Freeport McMoRan Gold, continued drilling on the BUGOW property in the Russell Lake area (6). Aber Resources also drilled on the SP claims and on a claim at Lajeunesse Bay. Canamax Resources Inc. drilled on a property at Mosher Lake (6) that was optioned from Roxwell Gold Mines. Noranda Exploration Co. Ltd. drilled the LEMON group.

Other Projects in Southern Slave Province

Aber Resources and Hemisphere Development, in joint venture, reported that a 15-hole, 1 542-m drill program on their Sunrise Lake property (11), had outlined a zinc-lead-silver-gold deposit. Tanqueray Resources Ltd. drilled over 300 m on the AP-45 claim at Murphy Lake (9), in the Cameron Volcanic Belt. Terra Mines Ltd. demobilized its test mill equipment on its Bullmoose property (10) and drilled 1 200 m on the WOLF claims at Spencer Lake (11).

Northern Slave Province

Aurun Mines drilled on its COM 1 and 2 claim blocks near Contwoyto Lake (g). The Back River Joint Venture conducted an extensive drilling program on the BRAU claims (18) and several prospecting permits between the Western River area and Beechey Lake. Bow River Industries Ltd., the operator of the Contwoyto Project, drilled on the BARB 1, AU 7, FIN and PIXIE claims. A high-grade gold intersection in one drill hole was reported.

Consort Energy Ltd. in joint venture with Western Canadian Mining Corporation, drilled on the WEST claim near the Lupin Mine (g).

Cominco Ltd., in joint venture with Cogema Ltée, drilled a newly discovered gold deposit on the AU 23, 24 claim block (14) optioned from the Contwoyto Syndicate. Three drill holes each penetrated several meters of sulphide-bearing iron formation grading 12 to 40 g/t of gold. South of Hood River, Cominco Ltd. drilled the property comprised of the SGJV and VER claims and Prospecting Permit 1031 (20).

Near Contwoyto Lake, Echo Bay Mines Ltd. drilled on the Lupin Mine area (g) and the CAR 9 claim at Concession Lake. Echo Bay Mines also drilled on the DOUGHALL claim in the Wilberforce Basin (23) and on the CUB 1 and RUSH 5 claims, both near Itchen Lake (15).

Giant Yellowknife Mines Ltd. drilled on the JOYCE, TANIA, PATRICIA claim block near the Lupin Mine (g). Hecla Mining Company of Canada drilled on the JOHN, SHIN and DLER claim group, namely on the northeastern side of Contwoyto Lake (g).

Orofino Resources and Dore-Nebraska Resources Inc. performed a small amount of drilling on the Canuc Resources Ltd. property, south of Arcadia Bay (22), Coronation Gulf.

Silver Hart Mines Ltd. drilled the Farney and G zones on the FARN and KNUT claims (21) in the Wilberforce Basin area. Eleven holes were completed on the TURNER, TURN claim block at Turner Lake (21), where five holes yielded inter-sections with gold assays.

Sirius Energy Corporation drilled six holes on the FIRE claims near Regan and Fiddler Lakes (17). Parklane Technologies Inc., in a joint venture with Highwood Resources Ltd., conducted geophysical and geochemical surveys on the ROX and VOX claims south of Contwoyto Lake (g) and drilled five holes on the NOD claims. Utah Mines Ltd. conducted geophysical surveys on the TROY claims (g), near the north end of Contwoyto Lake.

Bathurst Block

Abermin Corporation trenched the Wombat zone at Roberts Lake (24), where high-grade, gold-bearing quartz veins were sampled.

Silver Hart Mines Ltd. drilled 1 800 m on the Warner property at Kathleen Lake (23) under an option agreement with Bear Creek Hills Estates Ltd.

Echo Bay Mines drilled three holes on the NEST claims (23) south of Gambit Lake, seven holes on the Bear 2, 3 claims (23), east of Gordon Lake and two holes on the adjacent BC 1 and 2 claims optioned from Bear Creek Hills Estates Ltd. The twelve holes totalled 815 m.

Chevron Canada Resources Limited and Galveston Resources Ltd. conducted an airborne EM survey over the LB claims east of Gordon Bay (23).

Gold Exploration in District of Keewatin

Gold exploration was confined to the Rankin-Ennadai Volcanic Belt extending between Rankin Inlet (40) and Ennadai Lake (26) and in the Yathkyed Lake area (36).

Abermin Corporation Ltd. conducted a geochemical survey, a VLF-EM survey, trenching and mapping on its SUND OG (27) property northeast of Cullaton Lake.

Sunmist Energy '86 Inc. conducted an airborne EM survey and till sampling survey on the SUNNY and MISTY claims (28) west of Maguse Lake. The Erick Lake gold property in the same area was tested by drilling.

In the Happtiyik Lake area (30), Noble Peak Resources conducted airborne and ground geophysical surveys and drilled on the HAPPY and NORM claims and prospecting permits optioned from Borealis Exploration Ltd.

Borealis Exploration Ltd. mapped, prospected and sampled on prospecting permits in the Ferguson River (41) area and Kaminak Lake area (29) and claims at Pistol Bay (31). The company drilled 1 270 m on the SUSAN claims near Fat Lake (31) before going underground to obtain a 3 000 t bulk sample. A 100 tpd test mill began operations at the end of November, 1987, to test the material. The mill operated for two days.

Canadian Nickel Co. Ltd. conducted geophysical surveys and sampling on the Igloo Project in the Wilson Bay area (31) and two gold showings were tested by drilling.

In the Yathkyed Lake area, Homestake Mineral Development Co. Ltd. conducted geophysical surveys on the SY claims (36) and adjoining prospecting permits. Several gold showings were drilled.

Joint venture partners Asamera Minerals Inc. and Comaplex Resources International Ltd. explored properties in the Baker Lake area and conducted work on permits and claims at Parker Lake (32), Whitehills Lake (34) and the Meadowbank-Tehek Project area (35). Several areas were surveyed by airborne EM and over 1 980 m of drilling were completed on the Phoenix zone, at the south end of the Baker Lake property. On the Parker Lake project, the best results were reported from one drill hole located south of Baker Lake.

Giant Yellowknife Mines Ltd. conducted an airborne EM survey over the SAM claims north of Phoenix Lake (33) and also conducted mapping and sampling.

Gold Exploration in Other Regions of the N.W.T.

On the East Arm of Great Slave Lake, Rupperee Resources Ltd. concluded an airborne EM survey over its Outpost Island claims (8). West of Wrigley, Giant Yellowknife Mines Ltd. drilled gold showings on the GRUMP claim (5).

Platinum Group Metals

Equinox Resources Ltd. conducted geochemical sampling, diamond drilling and trenching on the VAL and SPEE claims (46) covering the Muskox Intrusion. Forty-six holes were drilled for a total of 3 171 m. The company reported high-grade platinum group metal assays in two drill holes.

In District of Keewatin, Asamera Minerals Inc. and Comaplex Resources International Ltd., in a joint venture, carried out geological mapping, magnetic and EM surveys on claims encompassing the former North Rankin Nickel Mine (40). A drill program is planned for 1988 to test platinum-group-element target areas.

Borealis Exploration Ltd. staked claims in the Rankin Inlet area (40) to explore for platinum group metals associated with ultramafic and gabbro sills in the area.

Homestake Mineral Development Co. Ltd. mapped and sampled claims and prospecting permits in the Ferguson Lake area (41), where Inco Ltd. delineated a copper-nickel deposit during the 1950s.

South of Great Slave Lake, Trigg, Wollett Olson Consulting Ltd. managed a 1 400 m drill program on Enexco International Ltd.'s Rutledge Lake claims (43). Surface showings of anomalous nickel, copper, platinum and/or gold and airborne EM conductors were tested at depth.

Highwood Resources Ltd. sampled the Caribou Lake Gabbro, which forms part of the Blatchford Lake Complex (44).

Uranium

On the northeast margin of the Thelon Basin, in the District of Keewatin, Urangesellschaft Canada Ltd. drilled on its Kiggavik property (formerly Lone Gull property) (1). Mineable reserves total 18 300 t of U^3O^8 at an average grade of 0.6 per cent U^3O^8 (or 0.5% diluted) in two zones. At least two other zones have been partly explored and airborne geophysical targets south of the Kiggavik deposit were tested by ground surveys and drilling.

South of Schultz Lake (1), PNC Exploration Co. Ltd. explored the F claims, optioned from BP-Selco Ltd. A number of potential drill targets were identified by geophysical surveys combined with geological analysis.

Southeast and east of Great Bear Lake, CEGB Exploration Canada Ltd. explored for uranium on Prospecting Permits 1098, 1099 in the Longtom Lake and Zebulon Lake area (4). The company also performed surveys in the Echo Bay, Contact Lake and McLeod Lake area (3) on the CROSS, BULLY and BULLWINKLE claims.

Base Metals

Pine Point Mines Ltd. conducted a \$2-million exploration program consisting mainly of IP surveys and surface drilling on its mine property (b). The program did not find new ore reserves to supply the company's mill.

Equinox Resources Ltd. explored for sphalerite (zinc sulphide) deposits enriched in gallium and germanium on claims near Wrigley (38) and on its prospecting permit west of Wrigley in the Mackenzie Mountains (39).

Cominco Ltd. conducted surface drilling in an effort to outline new reserves on its Polaris zinc-lead mine property (d).

Nanisivik Mines Ltd. surface drilled geophysical anomalies on its Nanisivik Mine property (f) in an effort to expand ore reserves. Underground drilling in the lower lens of the mine deposit proved additional reserves that were formerly categorized as probable.

Table 5
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	Urangesellschaft	Kiggavik	U
1	PNC Exploration	Schultz Lake	U
2		Nonacho Lake	U
3	CEGB Exploration	Echo Bay	U
4	CEGB Exploration	Hottah Lake	U
5	Giant Yellowknife	GRUMP	Au
6	Aber/Freeport McMoRan	BUGOW	Au
6	Aber	Russell Lake	Au
6	Aber	Lajeunesse Bay	Au
6	Aber	Mosher Lake	Au
6	Canamax	Mosher Lake	Au
6	Noranda	Russell Lake	Au
6	Hemisphere	Russell Lake	Au
6	Viscount	Russell Lake	Au
6	Asamera/Kelmet	Russell Lake	Au
6	Prolific Petroleum	Russell Lake	Au
7	Neptune	COLOMAC	Au
7	Echo Bay/Petromet/ Comaplex	KIM	Au
7	Echo Bay/Petromet/ Comaplex	SPAN	Au
7	Mahogany/Treasure Island	Spider Lake	Au
7	Tanqueray	Indin Lake	Au
7	Comaplex	Indin Lake	Au
8	Rapparee	Outpost Island	Au, W
9	Blackridge/Cruiser	Gordon Lake	Au
9	Canamax	Discovery Mine	Au
9	Candorado	Gordon Lake	Au
9	Giant Bay	Gordon Lake	Au
9	Lightning Minerals	Dome Lake	Au
9	Westfort/Cameron	Myrt Lake	Au
9	Tremingo	GAB	Au
9	Utah Mines	Fenton Lake	Au
9	Tanqueray	Murphy Lake	Au
10	Terra	Bullmoose Lake	Au
10	Noranda	Weaver Lake	Au
10	Viscount	Hidden Lake	Au
10	Ardic	Thompson-Lundmark Mine	Au
11	Highwood/Hemisphere	Sunset Lake	Au
11	Terra	Spenser Lake	Au
11	Giant Yellowknife	Bridge Lake	Au
12	Utah Mines	Indian Mountain Lake	Au
12	Giant Yellowknife/ Kelmet/Asamera	Indian Mountain Lake	Au

Table 5 (Continued)
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
13	Gunnar/Mill City	Winter Lake	Au
13	Doelcam	WIN, TER	Au
14	Cominco/Cogema	AU 23, 24	Au
15	Echo Bay	Itchen Lake	Au
15	Echo Bay	Leanne Lake	Au
15	Utah Mines	MIRAGE	Au
16	Echo Bay	Redrock Lake	Au
17	Sirius Energy	Regan Lake	Au
17	Utah Mines	ROYAL	Au
18	Back River JV	Beechey Lake	Au
19	Asamera/Kelmet	Amoeba Lake	Au
20	Cominco	SGJV, VER	Au
21	Silver Hart	FARN, KNUT	Au
21	Silver Hart	Turner Lake	Au
22	Orofino	ARCADIA	Au
23	Echo Bay	DOUGHALL	Au
23	Silver Hart	WARNER	Au
23	Echo Bay	Gambit Lake	Au
23	Echo Bay	Hiukitak River	Au
23	Chevron/Galveston	Gordon Bay	Au
23	Anderson and Kizan		Au
23	Bear Creek Hills	Hiukitak River	Au
24	Abermin	Hope Bay	Au
25	J.S. Kermeen	McLintock Lake	Au
26	Comaplex	Rochon Lake	Au
27	Abermin	SUNDOG	Au
28	Sunmist Energy	Maguse Lake	Au
29	Dejour/Noble Peak	Turquetil Lake	Au
29	Borealis	Kaminak Lake	Au
30	Noble Peak	Happotiyik Lake	Au
31	Borealis	Fat Lake	Au
31	Canadian Nickel	Wilson Bay	Au
31	Faraway Gold	Whale Cove	Au
32	Asamera/Comaplex	Parker Lake	Au
33	Asamera/Comaplex	Phoenix Lake	Au
33	Giant Yellowknife	SAM	Au
34	Asamera/Comaplex	Whitehills Lake	Au
35	Asamera/Comaplex	Tehek	Au
36	Homestake	Yathkyed Lake	Au
37	Highwood	Blanchet Island	Co
38	Equinox	Wrigley	Zn, Ga, Gr
39	Equinox		Zn, Ga, Gr
40	Borealis	Rankin Inlet	Pt, Cu, Ni
40	Asamera/Comaplex	Rankin Inlet	Pt, Cu, Ni

Table 5 (Continued)
Exploration - Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
41	Homestake	Ferguson Lake	Pt, Cu, Ni
41	Borealis	Ferguson Lake	Au
42	Anderson and Kizan	Thoa Lake	Cu, Ni
42	Anderson and Kizan	Opascal Lake	Cu, Ni
43	Enexco	Rutledge Lake	Pt, Cu, Ni
44	Highwood/Hecla	Thor Lake	Be
44	Highwood	Caribou Lake	Pt
45	J.W. Price	Conway Lake	
46	Equinox	Muskox	Pt, Cu, Ni
b	Pine Point	Pine Point	Pb, Zn
c	Canamax	Clan Lake	Au
c	Noranda	BOSS	Au
c	Troymin/Coronado	MON, DIS	Au
c	Kelmet	Walsh Lake	Au
c	Nerco-Con	Con Mine	Au
c	Giant Yellowknife	Giant Mine	Au
c	Golden Marlin	Yellowknife Bay	Au
d	Cominco	POLARIS	Pb, Zn
e	Noranda/Getty	FAT (Tundra)	Au
e	Bow Valley/Hemisphere	Courageous Lake	Au
e	Giant Yellowknife		Au
e	Bow Valley	BS	Au
e	Parklane/Highwood	NOD	Au
e	Aber	JAX	Au
e	Colray/Claude Resources	MIST, BULLY	Au
e	Gunnar/Mill City		Au
f	Nanisivik	Nanisivik Mine	Pb, Zn
g	Parklane/Highwood	ROX, VOX	Au
g	Utah Mines	TROY, RISK	Au
g	Aurun	Contwoyto Lake	Au
g	Bow Valley	Contwoyto Lake	Au
g	Consort/Western Canadian	WEST	Au
g	Echo Bay	CAR 9	Au
g	Hecla	JOHN, SHIN, DLER	Au
g	Giant Yellowknife	JOYCE, TANIA, PATRICIA	Au

Footnotes for Tables 5 and 6

(1) Table location is made with reference to corresponding numbers on Yukon and Northwest Territories maps. Locations are approximate.

(2) Abbreviated name of the Company is used: Expl. (Exploration), Ltd./Ltée (Limited), JV (Joint Venture).

(3) Geographical areas are indicated by small print, whereas claims and groups are capitalized. Abbreviated words are: Peninsula (Pen), River (R), Lake (L).

(4) Metal(s) of primary importance defined by chemical symbols: copper (Cu), gold (Au), lead (Pb), tantalum (Ta), lithium (Li), asbestos (Asb), molybdenum (Mo), silver (Ag), barium (Ba), cobalt (Co), tin (Sn), iron (Fe), tungsten (W), niobium (Nb), beryllium (Be), rare earth elements (REE), mercury (Hg), antimony (Sb), uranium (U), fluoride (F), gallium (Ga) and germanium (Gr).

Table 6
Exploration - Yukon

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1		Fortymile River	Placer Au
2	Eldorado Placers	Sixtymile River	Placer Au
2	Klondike Underground	Miller Creek	Placer Au
2	ESSO	SIXTYMILE	Au, Ag
3	White Channel Underground	Klondike	Placer Au
3	Granville JV	Gold Run Creek	Placer Au
3	Cominco	BRONSON	Au, Cu, Pb
3	Dawson Eldorado	LONE STAR	Au
3	Volcano Resources	KEY	Au
4	All North	LAW	Au
4	United Keno Hill	HUN, KIN	Au
5	Queenstake	Clear Creek	Placer Au
6	Silverquest	QUEST	Au, Ag, Pb, Zn
7	NDU Resources	CLARK	Ag, Pb, Zn
8	Silverquest	PIKE	Au
9	Moosehorn	REEF	Au
10	Noranda	TAD	Au, Ag, Pb, Zn
11	Nordac/Rexford	FIELD	Au
12	Nordac/Rexford	NUCLEUS, REVENUE	Au, Cu
12	Nordac/Rexford	STODDART, GOLDSTAR	Au, Ag
12	Noranda	ELEPHANT, DART	Au, Ag
12	Nordac/Rexford	ANTONIUK	Au
12		Big Creek	Placer Au
13		Nansen Creek	Placer Au
13	Nordac/Rexford	TOAST	Au
13	Chesbar/States	VIC	Au
13	Aurchem	GOULTER	Au, Ag
13	Chevron	Mt. Nansen	Au, Ag
13	Chevron	RUSK, TAWA	Au, Ag, Pb
14	Kerr Addison	MAG	Au
15	United Keno Hill	RUBY	Au
15	Silverquest	SHUT	Au, As
16		Burwash	Placer Au
16	United Keno Hill	DWA	Au
16	Silverquest	DONJEK	Cu
16	Pak-Man/Rockridge	AIRWAYS	Pt, Cu, Ni
17	Noranda	SEMENOF	Au, Cu
18	Noranda/Golden Nevada	Grew Creek	Au, Ag
19		Livingstone Creek	Placer Au
20	Aurich	LOON	Au, Cu
20	United Keno Hill	CAP	Au
21	Whitehorse Copper	BONZO, GEM	Au, Cu
22	All North	WAS, TOO	Au
23	Fairfield	RAM	Au
23	Canamax	BOBBY	Au, Ag
23	Cominco/Cinnabar	TAY	Au, Cu
23	Curragh	MM	Ag, Pb, Zn, Cu
24	Canamax	Ketza River	Au, Ag

Table 6 (Continued)
Exploration - Yukon

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
24	Golden Pavilion	SONNY	Au
24	Mountain Province	WHITE	Au, Ag, Pb
24	Canamax	Mt. Misery	Au, Ag
24	Canamax	SHARON, QUILL, HOEY, SLIDE LAKE	Ag, Pb, Au
25	Noranda	TES	Au
26	Silver Hart	MIDNIGHT (CMC)	Ag, Pb
27	Pak-Man/2001 Resources	LIZ	Ag, Pb, Zn
27	Goldex	LUCK	Ag, Pb
28	Fairfield	LOGAN	Ag, Zn
29	Tarmachan	MOLLY	Au, Mo
30	Canamax	HUNDERE	Ag, Zn, Pb
31	Novamin/NDU Resources	PORKER	Au, Zn
32	Novamin	MEL	Pb, Zn, Ba
33	All North/Chevron	REX	Pt
34	Rockridge	DUKE	Pt, Ni, Cu
35	All North	WELLGREEN	Pt, Ni, Cu
35	Rockridge/2001 Resources	LINDA	Pt, Ni, Cu
35	Silverquest	WASH	Pt, Ni, Cu
35		REED	Pt
36	Rockridge/All North	CANALASK	Pt, Ni, Cu
36	Silverquest	CATS & DOGS	Pt, Ni, Cu
37	Cody Hawk	O'BRIEN	Au
38	United Keno Hill	RIGEL	Au, Ag
38	Omni	COLLEGE GREEN	Au, Ag
38	All North	BEN	Au, Ag
a		Mayo	Placer Au
a	United Keno Hill	Keno Hill	Ag, Pb, Zn
a	Orex	MT. HINTON	Ag, Au
d	Mt. Skukum	MT. SKUKUM	Au, Ag
d	Mine Quest	PART, AUL	Au, Ag, Pb
d	Kerr Addison	BUG, BOUDETTE	Au
d	Omni	SCAR	Au, Ag
d	Omni	MT. REID	Au, Ag
d	Pacific Trans-Ocean	GLENLIVET	Au, Ag, Pb, F
d	All North	MAC	Au, Ag
d	Berglynn/Skukum Ventures	MT. STEVENS	Au, Ag
d	Pacific Trans-Ocean	EARL, SAID	Au, Ag
d	All North	SON	Au

Table 7
Mineral Production - 1978-1987

Yukon Territory		1978	1979	1980	1981	1982	1983	1984	1985	1986(R)	1987(P)
Mineral											
Gold	\$ kg	8 518 731 1 202	13 749 271 1 190	63 029 000 2 982	66 382 000 3 746	39 721 000 2 656	50 337 000 3 006	44 419 000 2 960	42 689 000 3 065	58 237 000 3 547	97 186 000 5 106
Silver	\$ kg	28 462 559 143 459	54 218 064 129 982	114 120 000 147 000	32 339 000 80 000	29 943 000 95 000	6 891 000 15 000	18 825 000 54 000	13 038 000 47 000	18 468 000 73 000	39 735 000 133 000
Lead	\$ kg	64 322 403 79 233 298	103 374 279 78 250 062	71 558 000 65 771 000	54 935 000 55 970 000	25 733 000 35 493 000	307 000 520 000	1 539 000 2 083 000	848 000 1 470 000	23 893 000 35 091 000	105 982 000 100 267 000
Copper	\$ kg	16 474 354 10 018 826	18 422 058 7 778 231	27 082 000 10 433 000	20 123 000 9 094 000	14 654 000 7 510 000	3 977 000 1 904 000		19 000 10 000	13 000 6 000	22 000 9 000
Zinc	\$ kg	74 076 827 96 673 141	109 460 866 113 572 783	88 313 000 90 938 000	94 237 000 78 806 000	58 519 000 54 537 000	31 000 27 000	244 000 173 000	137 000 109 000	61 521 000 50 634 000	196 806 000 154 479 000
Bismuth	\$ kg							2 000 162	11 000 1 000	5 000 541	7 000 660
Cadmium	\$ kg	355 58					6 000 2 000	9 000 2 000	5 000 1 000	8 000 2 000	26 000 5 000
Asbestos	\$ t	26 948 800 53 255									
Sand and Gravel	\$ t					550 000 463 000	1 438 000 480 000	5 105 000 3 074 000	2 995 000 1 185 000	13 355 000 4 902 000	6 960 000 2 400 000
Sulphur (smelter gas)	\$ t								267 000 2 000	1 000 7	
Coal (E)	\$ t	318 000 16 578	363 000 23 003	287 000 16 529	368 000 20 860					209 000 17 233	245 000 20 000
TOTAL	\$	218 804 029	299 244 538	364 389 000	268 016 000	169 120 000	62 987 000	70 143 000	60 069 000	176 310 000	447 449 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.

(P) Preliminary Figures, (R) Revised Figures, (E) Estimated

Table 8
Mineral Production - 1978-1987

Northwest Territories		1978	1979	1980	1981	1982	1983	1984	1985	1986(R)	1987(P)
Mineral											
Gold	\$	45 769 718	61 868 488	96 920 000	85 495 000	91 415 000	144 570 000	191 071 000	177 079 000	205 266 000	224 797 000
	kg	6 459	5 356	4 209	4 825	6 113	8 634	12 732	12 713	12 503	11 810
Silver	\$	23 854 173	34 770 651	41 331 000	13 456 000	16 073 000	33 743 000	20 361 000	9 083 000	5 478 000	3 827 000
	kg	120 237	83 358	53 000	33 000	51 000	74 000	59 000	33 000	22 000	13 000
Copper	\$	518 993	941 732	679 000	613 000	419 000	214 000	130 000	46 000	1 000	
	kg	315 624	397 191	262 000	277 000	215 000	102 000	69 000	23 000	1 000	
Lead	\$	56 898 673	80 117 935	55 853 000	44 680 000	46 367 000	47 901 000	66 647 000	44 489 000	91 129 000	142 166 000
	kg	70 088 814	60 645 969	51 337 000	45 522 000	63 955 000	81 161 000	90 198 000	77 083 000	133 836 000	134 499 000
Zinc	\$	143 911 352	205 600 051	172 556 000	159 764 000	229 110 000	269 951 000	386 813 000	356 415 000	322 064 000	417 429 000
	kg	187 809 913	213 323 454	175 685 000	133 604 000	213 523 000	234 883 000	274 920 000	284 223 000	265 073 000	327 653 000
Cadmium	\$						10 000	1 034 000	866 000	670 000	912 000
	kg						3 000	214 000	238 000	175 000	160 000
Bismuth	\$						163 000	34 000	60 000		2 000
	kg						32 000	3 000	3 000		189
Tungsten Trioxide (E)	\$	47 310 800	52 924 000	67 646 000	43 363 000	38 353 000	11 221 000	33 584 000	38 918 000	17 363 000	
	kg	2 885 619	3 254 067	4 007 000	2 515 000	2 925 000	1 126 000	3 112 000	3 529 000	2 470 000	
Arsenic Trioxide (E)	\$				561 000	3 862 000	2 345 000	5 837 000	1 969 000	254 000	370 000
	t				1 094	1 780	982	4 684	4 098	406	
Sulphur (smelter gas)	\$								11 665 000	21 788 000	15 379 000
	t								98 000	147 000	100 000
Sand and Gravel	\$					41 482 000	32 479 000	36 323 000	8 981 000	3 281 000	4 225 000
	t					6 625 000	5 905 000	7 249 000	6 803 000	986 000	1 300 000
Stone	\$					1 268 000	14 601 000	4 617 000	434 000	1 011 000	810 000
	t					323 000	2 409 000	729 000	163 000	368 000	340 000
TOTAL	\$	318 262 909	436 222 857	434 985 000	347 841 000	468 349 000	557 198 000	746 451 000	649 732 000	668 452 000	810 005 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.
(P) Preliminary Figures, (R) Revised Figures, (E) Estimated



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Introduction

This report covers mines and mineral activities for the Yukon and Northwest Territories for the calendar year 1988.

It was compiled and written by D.D. Brown and T.W. Caine of the Mining Legislation and Resource Management Division of the Department of Indian Affairs and Northern Development (DIAND), Ottawa. M.K. Buck wrote the Northern Commodities Overview. Sections on mineral exploration and production are based on mining activity overviews produced by DIAND regional geological staff under the direction of S. Morison in the Yukon and W.A. Padgham in the Northwest Territories.

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Summary

Yukon

The value of mineral commodities produced in Yukon in 1988 was estimated at \$645.9 million compared with \$474 million in 1987. Most of the production value was derived from four hard-rock mines and 234 seasonal placer gold operations. The largest mine in Yukon, Curragh Resource's Faro zinc-lead-silver operation, produced a record 515 000 t of zinc and lead concentrate, well above last year's output. The strengthening of zinc and lead prices made 1988 a remarkably good year.

Gold prices followed a downward trend in 1988. However, placer gold production surpassed the previous record set in 1917. Approximately 4 078 kg of fine gold were presented for royalty payment in 1988, compared with 3 300 kg in the previous year. The placer industry accounted for 84 per cent of the Yukon's gold production. In March 1988, the Ketza River gold mine started milling and, in August 1988, the Mount Skukum mine closed because of dwindling ore grades.

Silver prices also fell during the year, but production was double that of the previous year because of higher output from both the Faro mine and United Keno Hill mines. In November, it was evident that low silver prices were crippling the United Keno Hill operation.

Gold, followed by base metals, silver and platinum group metals, were the driving force behind mineral exploration and development activity. At year's end, Curragh Resources was proceeding with development for production from its Vangorda Plateau deposits (GRUM, VANGORDA, DY) in the 1990's. Omni Resources and Skukum Gold Inc. were also proceeding toward production with development on their Skukum Creek gold-silver property. B.Y.G. Natural Resources and Chevron Minerals were moving toward a production decision on their Mount Nansen gold-silver property.

Yukon's four hard-rock mines employed 845 persons directly in 1988. In addition, Yukon's placer mining industry employed an estimated 650 seasonal workers.

Yukon accounted for 45.7 per cent of the lead, 26.4 per cent of the zinc, 17.6 per cent of the silver and 3.8 per cent of the gold produced in Canada during 1988. Yukon's metallic mineral production amounted to 4.6 per cent of the value of the Canadian total in 1988, compared with four per cent in 1987.

Northwest Territories

In 1988, minerals in the Northwest Territories were produced principally from seven hard-rock mines: four gold mines and three zinc-lead-(silver) mines. The largest operation in the N.W.T., the Pine Point mine, processed its last ore on April 6, 1988. At its production peak, the mine employed over 650 workers and accounted for close to 16 per cent of the N.W.T.'s total value of mineral production. In April, Treminco Resources brought the small Ptarmigan Mine, a former gold producer, back into production.

The value of mineral production in the N.W.T. was estimated at \$766 million in 1988, compared with \$713 million a year earlier. Much of the increase was due to higher zinc production and a steady rise in zinc prices. With the closing of mill production at the Pine Point, lead output was reduced appreciably. Gold production value followed the downward trend of gold prices in 1988. Together, zinc and lead production accounted for 71 per cent of the total value of mineral shipments, while gold production accounted for 26 per cent.

During 1988, the most important mining development was the commissioning of the \$25-million Giant Yellowknife Mines tailings re-treatment plant. It is designed to process 7 300 t of tailings per day and to recover about half of the 2.3 g of gold per t contained in the Giant Mine tailings. Neptune Resources Corp. proceeded with construction of its 9 000 t per day mill and open-pit mine project on its COLOMAC property, north of Indin Lake. Total construction and pre-production costs will exceed \$150 million. In November, Treminco Resources Ltd. started work on a new head frame for the Ptarmigan mine shaft. Also, Noranda Inc. and Total Energold Corporation started a two-year, \$35-million underground exploration program on the TUNDRA (FAT) property in the Courageous Lake area.

The mineral industry in the N.W.T. accounted for 23.1 per cent of the zinc, 20.2 per cent of the lead, 8.9 per cent of the gold and 1.8 per cent of the silver produced in Canada in 1988. The value of these metals, combined with by-products bismuth and cadmium, accounted for 5.5 per cent of Canada's metallic mineral production in 1988, compared with 6.4 per cent in 1987.

Operating mines in the N.W.T. directly employed 1,848 persons in 1988, compared with 2,110 in 1987.

Sommaire

Yukon

En 1988, la production minière du Yukon a été évaluée à 645,9 millions de dollars, comparative-ment à 474 millions en 1987. La majeure partie provenait de quatre mines en roche dure et de 234 sites d'exploitation saisonnière de placers. La mine la plus importante du Territoire, la mine de zinc, plomb et argent de la Curragh Resources de Faro, a réalisé une production record de 515 000 t de concentré de zinc et de plomb, soit une nette augmentation par rapport à l'année précédente. Il s'agit donc d'une année particulièrement bonne car les prix du zinc et du plomb se sont consolidés au cours de l'année.

Les prix de l'or ont par ailleurs suivi une courbe descendante. Toutefois, la production d'or provenant des placers a dépassé le record antérieur établi en 1917. En 1988, la quantité de ce métal déclarée aux fins de redevances a atteint environ 4 078 kg d'or fin, comparativement à 3 300 kg l'année précédente. La production de l'industrie des placers a représenté 84 p. 100 de la production d'or du Territoire. En mars 1988, la mine d'or de la rivière Ketza a commencé à traiter son minerai, mais, en août, la mine du mont Skukum a fermé ses portes en raison d'une baisse de la teneur du minerai.

Les prix de l'argent ont aussi faibli au cours de l'année, mais la production de ce métal a été le double de celle de l'année précédente en raison du rendement plus élevé de la mine Faro et des mines de la United Keno Hill. En novembre, il était évident que les prix peu élevés de l'argent portaient atteinte aux activités de la United Keno Hill.

L'or a constitué l'élément moteur des activités minières d'exploration et de mise en valeur, suivi par les métaux communs, l'argent et le platine. À la fin de l'année, la Curragh Resources a procédé à l'aménagement de ses gisements du plateau Vangorda (GRUM, VANGORDA, DY) en vue de leur mise en exploitation dans les années 1990. La Omni Resources et la Skukum Gold Inc. ont également préparé la mise en exploitation de leur propriété aurifère et argentifère de Skukum Creek par des travaux d'aménagement. Les sociétés B.Y.G. Natural Resources et Chevron Minerals étaient sur le point de prendre une décision concernant l'exploitation de leur propriété aurifère et argentifère du mont Nansen.

Les quatre mines en roche dure du Yukon ont procuré des emplois directs à 845 personnes en 1989, et on estime que les exploitations de placers du Territoire ont fourni de l'emploi saisonnier à 650 personnes.

En 1988, les mines du Yukon ont produit 45,7 p. 100 du plomb, 26,4 p. 100 du zinc, 17,6 p. 100 de l'argent et 3,8 p. 100 de l'or extraits au Canada. Les minéraux métalliques produits équivalaient à 4,6 p. 100 de la production canadienne en 1988, comparativement à 4 p. 100 en 1987.

Territoires du Nord-Ouest

En 1988, la production minière des Territoires du Nord-Ouest provenait principalement de sept mines en roche dure, dont quatre d'or et trois de zinc, plomb (et argent). La mine la plus importante des T. N.-O., la mine Pine Point, a traité son dernier stock de minerai le 6 avril 1988. Au moment de sa production maximale, elle employait 650 travailleurs, et sa production représentait près de 16 p. 100 de celle des T. N.-O. En avril, la Treminco Resources a remis en activité la petite mine d'or Ptarmigan, déjà exploitée auparavant.

On a évalué à 766 millions de dollars la valeur de la production minière dans les T. N.-O. en 1988, comparativement à 713 millions l'année précédente. Une bonne partie de l'augmentation résultait de la production plus importante de zinc et de la montée régulière des prix du zinc au cours de l'année. L'arrêt de la production à la mine Pine Point dans la première moitié de l'année a entraîné une réduction sensible de la production de plomb. La production d'or a suivi la tendance à la baisse des prix de ce métal en 1988. La production combinée de zinc et de plomb a représenté 71 p. 100 des expéditions totales de minéraux alors que la production d'or correspondait à 26 p. 100.

L'événement le plus important, en 1988, dans le domaine de l'exploitation minière a été la décision de construire l'usine de retraitement des résidus des mines Giant Yellowknife, au coût de 25 millions de dollars. L'usine est conçue pour traiter 7 300 t de résidus par jour et recouvrer environ la moitié des 2,3 g d'or par tonne contenus dans ceux-ci. La Neptune Resources Corp. a construit une usine d'une capacité de 9 000 t par jour et entrepris un projet de mine à ciel ouvert sur sa propriété COLOMAC, au nord du lac Indian. Les dépenses totales pour la construction et les travaux préliminaires dépasseront 150 millions de dollars. En novembre, la Treminco Resources Ltd. a entrepris la construction d'une nouvelle structure de tête de puits à sa mine Ptarmigan. La Noranda Inc. et la Total Energold Corporation ont amorcé un programme d'exploration souterraine de deux ans, qui coûtera 35 millions de dollars, sur leur propriété TUNDRA (FAT), dans la région du lac Courageous.

Les mines des T. N.-O. ont extrait 23,1 p. 100 du zinc, 20,2 p. 100 du plomb, 8,9 p. 100 de l'or et 1,8 p. 100 de l'argent produits au Canada en 1988. La valeur de ces métaux, à laquelle il faut ajouter celle des dérivés que constituent le bismuth et le cadmium, représentait 5,5 p. 100 de la production canadienne de minéraux métalliques, comparativement à 6,4 p. 100 en 1987.

Les mines en exploitation dans les T. N.-O. ont procuré des emplois directs à 1 848 personnes en 1988, comparativement à 2 110 en 1987.

Mines and Mineral Activities

Yukon

Mineral Production

The value of mineral commodities produced in Yukon in 1988 was estimated at \$645.9 million compared with \$474 million in 1987. Most of the production value was derived from four hard-rock mines and 234 seasonal placer gold operations. The largest operation in the territory, Curragh Resource's Faro zinc-lead-silver mine produced, a record 515 000 t of zinc and lead concentrate, well above last year's output. The strengthening of zinc and lead prices made 1988 a remarkably good year.

Gold prices followed a downward trend in 1988. However, placer gold production surpassed the previous record set in 1917. Approximately 4 078 kg of fine gold were presented for royalty payment in 1988, compared with 3 300 kg in the previous year. The placer industry accounted for 84 per cent of the territory's gold production. In March 1988, the Ketza River gold mine started milling and in August 1988, the Mount Skukum mine closed because of dwindling ore grades.

Silver prices also fell during the year, but silver production was double that of the previous year because of higher output from both the Faro mine and United Keno Hill mines. In November, it was evident that low silver prices were crippling the United Keno Hill operation.

Gold, followed by base metals, silver and platinum group metals, were the driving force behind mineral exploration and development activity. At year's end, Curragh Resources was proceeding with development for production from its Vangorda Plateau deposits (GRUM, VANGORDA, DY) in the 1990s. Omni Resources and Skukum Gold Inc. were also proceeding toward production, with development on their Skukum Creek gold-silver property. B.Y.G. Natural Resources and Chevron Minerals were moving toward a production decision on their Mount Nansen gold-silver property.

Yukon's four hard-rock mines employed 845 persons directly in 1989. In addition, the Yukon placer mining industry employed an estimated 650 seasonal workers.

Yukon accounted for 45.7 per cent of the lead, 26.4 per cent of the zinc, 17.6 per cent of the silver and 3.8 per cent of the gold produced in

Canada during 1988. Yukon's metallic mineral production amounted to 4.6 per cent of the value of the Canadian total in 1988, compared with 4.0 per cent in 1987.

Mines

Canamax Resources Inc. and Pacific Trans-Ocean Resources Ltd., Ketza River Mine

The Ketza River mine (c)*, the Yukon's newest mine, started in early March and poured its first gold-silver bar in late April. By year's end, mill throughput was 86 664 t of ore and 635.3 kg of gold and 6.8 kg of silver were produced. The ore mined and processed during the year was from the oxide reserves of the Peel and Ridge zones. The oxide reserves from these zones and the Break zone were recalculated in November using a lower specific gravity value, resulting in lower estimates of oxide ore reserves than previously thought. Oxide reserves at year end were sufficient for two years of production life. However, sulphide reserves could extend the mine's life into the 1990s.

Type:	underground
Location:	60 km south of Ross River
Product:	gold
Mill Capacity:	320 tpd
Tonnes Milled:	86 664 t
Oxide Reserves:	230 000 – 250 000 t (December 31, 1988)
Oxide Reserve Grade:	12.0 – 13.1 g/t gold
Sulphide Reserves:	480 000 t (December 31, 1988)
Sulphide Reserve Grade:	10.7 g/t gold
Employees:	105

Table 1:
Mineral Production of Operating Mines in the Yukon, 1986, 1987, 1988 and Employment, 1988

Company, Mine and Commodity	1986		1987		1988(P)		Number of Employees (1)
	t	kg	t	kg	t	kg	
<i>Canamax Resources Inc.</i>							
gold	-----	-----	-----	-----	-----	635.3	105
silver	-----	-----	-----	-----	-----	6.8	
<i>Curragh Resources Corp.</i>							
Faro Mine							
zinc	62 951	-----	184 727	-----	200 927	-----	450
lead	38 204	-----	121 539	-----	149 354	-----	
silver	-----	42 753	-----	109 202	-----	214 051	
<i>Dawson Eldorado Mines Ltd.</i>							
Plata-Inca							
silver	-----	1 244	-----	857	-----	-----	nil
lead	N/A	-----	N/A	-----	-----	-----	
<i>Nadahini Mining Corporation</i>							
Whiskey Lake							
coal	17 233	-----	20 000	-----	10 000	-----	
<i>Total Erickson Resources Ltd.</i>							
Mount Skukum							
gold	-----	933	-----	1 379	-----	168.5	90
silver	-----	715	-----	1 068	-----	N/A	
<i>United Keno Hill Mines Ltd.</i>							
Elsa area mines							
silver	-----	53 187	-----	46 437	-----	54 181	200
lead	1 355	-----	1 605	-----	2 818	-----	
zinc	66	-----	385	-----	300	-----	
<i>Whitehorse Coal Corporation</i>							
coal	1 800	-----	-----	-----	2 721	-----	
TOTAL							845

Source:
Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

N/A = Not available -- = nil
(P) = Preliminary (1) = number of employees at year end 1988

Curragh Resources Inc., Faro Mine

In 1988, the Faro Mine (b) processed 4 126 000 t of ore to recover 200 927 t of zinc, 149 354 t of lead and 214 051 kg of silver. This output was contained in 315 000 t of zinc concentrate and 200 000 t of lead concentrate. Mine production was suspended from June 10 – July 7 because of a mine workers' strike.

In 1991, the Faro open-pit mine will switch to an underground operation because the open-pit reserves will be depleted. Underground reserves could extend the life of the Faro Mine to 1993.

Work during 1988 continued on the haulage road from the Faro mill to the Vangorda Plateau zinc-lead-silver deposits (GRUM, VANGORDA, DY). Overburden stripping of the Vangorda and Grum open-pit areas (35) was conducted. Production from the Vangorda deposit is scheduled to begin in 1992. The Grum deposit is scheduled to begin production in 1993. The DY deposit could be brought into production as early as 1995.

Type:	open-pit
Location:	13 km north of Faro
Product:	zinc, lead, silver
Mill Capacity:	13 500 tpd
Tonnes Milled:	4 126 000 t
Reserves:	15 million t (December 31, 1987)
Reserve Grade:	3.37% lead, 4.69% zinc, 45 g/t silver
Employees:	450

Geological Resources and Reserves of Vangorda Plateau Deposits

Mineral Deposit	Millions of tonnes	% Zinc	% Lead	g/t Silver	g/t Gold
GRUM	30.6 (24 million t by open-pit)	5.8	3.4	57	1.0
VANGORDA	7.5 (six million t by open-pit)	4.9	3.8	54	0.8
DY	21.0	6.7	5.5	84	1.0

* Numbers or letters in parenthesis indicate the location of the property on the map near the centrefold.

Total Energold Corporation and AGIP Resources Ltd., Mount Skukum Mine

Total Energold Corporation owns 37 per cent of the Mount Skukum gold mine (d). Total Resources (Canada) Ltd., the parent of Total Energold merged with Getty Resources in January 1988; several months later Getty Resources and Total Erickson Resources merged, to bring the operation of the mine under the aegis of Total Energold. The mine is operated with the joint venture partner, AGIP Resources Ltd.

In the first half of 1988, the Mount Skukum mill processed 27 993 t of ore, with an average grade of 6.59 g of gold per t, to produce 168.5 kg of gold. This production compares with 97 011 t of ore grading 15.4 g of gold per t and production of 1 378.5 kg of gold in 1987. On June 21, 1988 the Mount Skukum mill shut down. On August 2, 1988 the joint venture partners announced an indefinite suspension of production because of inconsistent mill feed. Underground development during the year was unable to confirm previously estimated drill-indicated reserves in the Lake zone. All ore supplied to the mill was supplied from the Cirque and Lake zones. The mill throughput in June had dropped to 90 t per day.

Almost 4 000 m of underground drilling and 1 164 m of development headings were completed during the year.

Type:	underground
Location:	90 km southwest of Whitehorse
Product:	gold
Mill Capacity:	273 tpd
Tonnes Milled:	27 933 t
Reserves:	36 000 t (December 31, 1988)
Reserve Grade:	13.7 g/t
Employees:	90 (June 1, 1988)

United Keno Hill Mines Limited, Elsa Area Mines

The company milled 91 897 t of ore at its Elsa mill compared with 78 834 t a year earlier. Production was derived mainly from six underground operations (the Husky, Husky SW, Elsa, No Cash, Silver King and Bellekeno mines), and one open-pit mine, the Onek (a).

Mill production in 1988 amounted to 54 818.4 kg of silver and 2 818 t of lead, all contained in concentrate. This compares with 46 436.8 kg of silver and 1 430 t of lead produced a year earlier.

The mine employed approximately 200 persons during most of the year. In November 1988, the company reduced the scope of its operations and work force because of low silver prices, a shortage of skilled miners and high operating costs. By January 1989, silver prices had fallen below U.S. \$6.00 per ounce. As a result, the company suspended production on January 6, 1989 and laid off 177 employees. The mine and mill will be maintained until silver prices have improved sufficiently to re-open the operation.

Type:	underground and open-pit
Location:	Keno Hill-Galena Hill area, near Elsa
Product:	silver, lead
Mill Capacity:	450 tpd
Tonnes Milled:	91 897 t
Reserves:	292 054 t (December 31, 1988)
Reserve Grade:	960 g/t silver, 4.6 % lead
Employees:	177 (December 31, 1988) 27 (January 31, 1989)

Small Seasonal Mine Operations

Nadahini Mining Corporation

The company operated the open-pit Whiskey Lake coal mine (e) located west of Ross River, under an agreement with Curragh Resources Inc. Coal production feeds the concentrator drier at the Faro mill. Nadahini mined approximately 10 000 t of bituminous coal in 1988 and drilled over 15 240 m to prove reserves for the 1989 mining season.

Whitehorse Coal Mining Corporation

The company mined approximately 2 721 t of coal from the Whitehorse (Mount Granger) property (f).

Anooraq Resources Ltd., Evelyn Creek Rhodonite Mine

The company mined rhodonite, from the Marlin property near Evelyn Creek (21). The mineral is a manganese silicate mineral, which is used as a decorative stone. In 1988, a 22-km access road was completed to the property. Total sales of rough rhodonite for the year amounted to \$212 000.

Placer Mining

Yukon's placer mining industry reported 5 098.4 kg of crude gold, or approximately 4 079 kg of fine gold for royalty payments. Gold production was valued at \$70.7 million and represented 84 per cent of Yukon's gold production. Placer gold production surpassed the previous record set in 1917, and compares with 4 136 kg of raw gold or approximately 3 300 kg of fine gold reported in 1987.

There were 234 active operations during the year employing a seasonal work force of approximately 650 people. The traditional placer mining areas continued to provide the bulk of the gold output. These include the Klondike (3), Indian (3), Sixtymile (2) and Lower Stewart River (4) drainage areas.


Gold City Resources, with three active open-pits, was one of the major producers in the Indian River area (3). Queenstake Resources Ltd. produced 146.2 kg of fine gold from its Black Hills Creek and Maisy Mae Creek (4) operations. Rise Resources Ltd. (3) reported that production during September 1988 averaged more than 2 633 kg (75 oz) of sluice-run fine gold per 22-hour shift. Grandex Resources reported production to June 15, 1988, of 25.5 kg of raw gold (900 oz) from its Swede Creek (10) property near Mayo.

Granges Exploration Ltd. mined its Lee property (2) at Sixtymile Creek. The company expected to produce between 56 kg and 85 kg of gold during the placer mining season. Klondike Gold Mining Corp. resumed winter underground mining of the frozen gold-bearing sand at Miller Creek in November 1987.

YUKON MINERAL EXPLORATION AND MINING - 1988

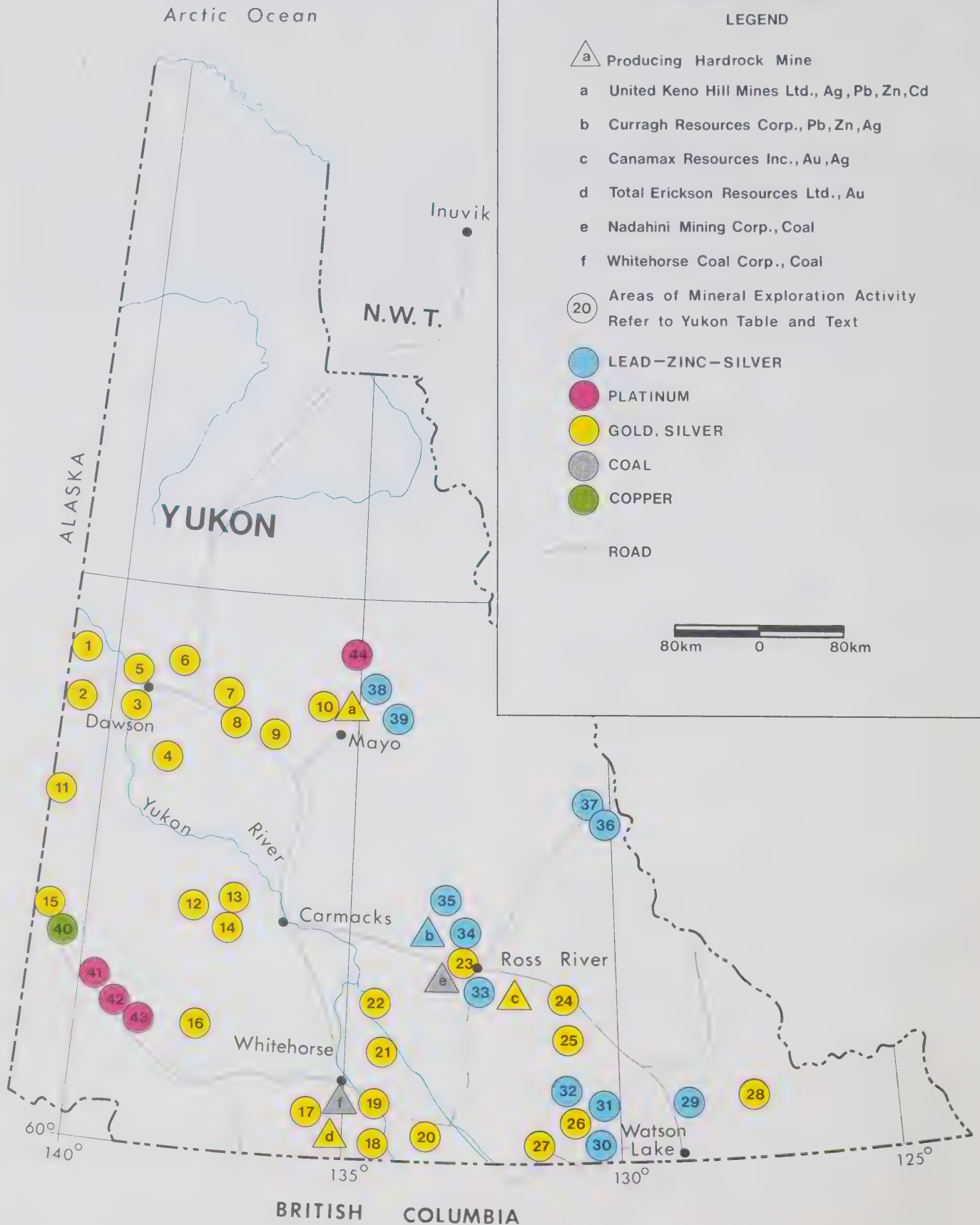
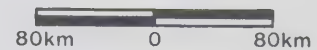
LEGEND

-  **a** Producing Hardrock Mine
- a United Keno Hill Mines Ltd., Ag, Pb, Zn, Cd
 - b Curragh Resources Corp., Pb, Zn, Ag
 - c Canamax Resources Inc., Au, Ag
 - d Total Erickson Resources Ltd., Au
 - e Nadahini Mining Corp., Coal
 - f Whitehorse Coal Corp., Coal

-  **20** Areas of Mineral Exploration Activity
Refer to Yukon Table and Text

-  LEAD-ZINC-SILVER
-  PLATINUM
-  GOLD, SILVER
-  COAL
-  COPPER

ROAD



Development

The closing of the Mount Skukum gold mine in August 1988 and the United Keno Hill Mines silver operation early in January 1989 was a setback for the territorial mining economy. At year end, Omni Resources Inc. and Skukum Gold Inc. were progressing toward initial production at the Skukum Creek gold-silver property (d), in the Wheaton River valley. Some 3 200 t mined and processed from the Rainbow zone showed good gold and silver recoveries using a cyanide flotation process. In November 1988, the joint venture was in the process of acquiring a mill and water licence for mill processing. The companies plan to begin production in 1989.

Curragh Resources was developing the Grum and Vangorda (35) zinc-lead-silver deposits for initial production in the early 1990s. In 1988, the overburden over the Grum open-pit area was being stripped and a road was being constructed to link the Vangorda Plateau area to the Faro mill. Capital spending over 1989-1993 to bring new ore reserves into production, is expected to amount to as much as \$200 million.

Mineral Exploration

Exploration expenditures in Yukon were estimated at \$50 million in 1988 compared with \$43 million in 1987. Exploration activities were directed principally to precious metals, including platinum group metals and, to a lesser extent, zinc-lead-silver deposits. More than 30 drill programs were reported, 10 on properties with significant proven reserves.

Table 2
Quartz Claims Recorded in Yukon in 1987 and 1988

Mining District	1987	1988
Whitehorse	6 002	3 885
Dawson	2 464	2 553
Mayo	558	877
Watson Lake	3 554	2 975
Total	12 568	10 290

Exploration Projects

Whitehorse Area

Skukum Gold Inc. and Berglynn Resources Inc. reported good gold intersections in holes drilled on the GODDELL claims (d). Of four holes completed, totalling 2 000 m, two holes intersected gold. The best intersection was 20.9 g of gold per t over 11.3 m and 13.4 g of gold per t over 6.4 m.

Adastral Resources Ltd. reported two new silver-gold-bearing veins on the AUL property (d) near Bennett Lake.

New Era Developments Ltd. drilled 23 holes totalling 1 524 m on its Red Ridge property (17), to test the Saddle and Miller zones. Gold and silver values were intersected in several drill holes over narrow widths.

On the CHARLESTON claims (d), Total Energold Corp. trenched and sampled the Charleston vein. A number of mineralized shoots along the length of the vein contained high gold and silver values.

At Marsh Lake, B. Cofer excavated gold-and silver-bearing quartz stringers on the ROSS BANK property (19).

Dunvegan Exploration Ltd. conducted trenching on the JUBE property (20) and exposed a gold showing in a quartz vein.

Omni Resources Inc. and Skukum Gold Inc. continued the exploration and development of the Skukum Creek (d) mine project. Over 6 000 m of diamond drilling was completed. Development included, driving of a new entry, extension of drifts in the Rainbow and Kuhn zones and the driving of a decline in the footwall of the Rainbow zone. Test mining of 3 200 t of ore was conducted to provide a bulk sample. Drill-proven reserves amounted to 747 110 t grading 7.71 g of gold per t and 307.2 g of silver per t. Additional indicated reserves amount to 119 210 t grading 8.95 g of gold per t and 169.7 g of silver per t.

In preparation for production in 1989, Skukum Gold Inc. leased the 273 tpd mill at the inactive Mount Skukum gold mine. However, early in 1989 the Yukon Territory Water Board refused to assign the existing water use licence for the Mount Skukum mill to the new Skukum Creek mine project.

Dawson Range

On the MOUNT NANSEN property (14), BYG Natural Resources Inc., in a joint venture with Chevron Minerals Ltd., concentrated on bringing the Brown-McDade reserves into the drill proven category and defining the open-pit reserves. In 1988, 5 443 m of diamond drilling in 85 holes outlined proven reserves of 124 606 t, grading 10.42 g of gold per t and 98 g of silver per t. Drill-proven underground reserves amount to 71 924 t, grading 13.18 g of gold per t and 433 g of silver per t. Both open-pit and underground proven reserves amount to 196 530 t, grading 11.42 g of gold per t and 221 g of silver per t. Reserves in all categories (proven, probable and possible) amount to 577 414 t, grading 11.78 g of gold per t and 197 g of silver per t.

The joint venture has concluded that the precious metal reserves from a number of zones can support a 270 t-per-day (tpd) mill for at least six years. The zones include the Brown-McDade, Heustis, Webber, Flex and Cabin Creek zones.

In 1988, BYG Resources acquired the TAWA property, located 10 km north of the Mount Nansen property (14). Six drill holes, totalling 377 m, and stripping and trenching revealed three separate mineralized zones. All six holes were drilled in the BRX zone. The gold-bearing zones were less than 2 m wide.

In the Mount Freegold area, Archer, Cathro and Associates (1981) Ltd. explored on the ANTONIUK and NUCLEUS properties (13) for Big Creek Joint Venture and Chevron Resources Ltd. On the ANTONIUK property (13), 35 rotary holes totalling 1 087 m defined the upper 20 m in the mineralized area suitable for test heap-leach mining. There are 3.73 million t of low grade oxide ore in reserves, with an average grade of 1.13 g of gold per t. On the nereby REVENUE property (13), two holes totalling 295.6 m intersected low-grade gold.

Other Mount Freegold (13) area drill programs were conducted on Rea Gold Corporation's RAG and GOLDY properties, Noranda Exploration's EMMONS HILL property and Doron Exploration's CARIBOU CREEK property. All companies reported gold assays from drill intersections. Intersections from five drill holes of a 12-hole program by Doron Explorations Inc. on the CARIBOU CREEK property, averaged 40.8 g of gold per t over 2.9 m. This property adjoins Doron's LA FORMA property where drill proven reserves are estimated at 181 000 t averaging 13.03 g of gold per t.

Ruby Range

Archer, Cathro and Associates (1981) Ltd. explored the SHUT property (16) for Pezgold Resources Ltd. under an option agreement with Silverquest Resources Ltd. and Dalbianco Syndicate. Chip samples taken from trenches in the east zone assayed 30 g of gold per t over 0.37 m.

Kluane Ranges

All-North Resources Ltd. conducted an extensive surface and underground drill program to increase the reserves of the east and west zone of the WELLGREEN deposit at the former Wellgreen nickel-copper mine property (42). Drill inferred reserves reported in January 1989 were 42.3 million t with an average grade of 0.35 per cent copper, 0.36 per cent nickel, 0.51 g of platinum per t, 0.34 g of palladium per t and other values of platinum group elements, gold, silver and cobalt. During 1989, All-North plans to conduct a drill program to delineate further and expand existing reserves in the Wellgreen deposit.

Drilling and trenching on the adjoining ARCH and LINDA properties (42) encountered disseminated mineralization comparable with that on the WELLGREEN property. One LINDA drill hole assayed 3.51 per cent nickel, 1.66 per cent copper, 2.74 g of platinum per t, 7.13 g of palladium per t and 3.04 g of other platinum group elements per t across 1.2 m. Several other companies including Nathan Minerals Ltd., Lodestar Explorations Ltd., Harjay Exploration Ltd. and Polestar Exploration Inc. explored similar targets.

Rancheria District

In the Rancheria area, Fairfield Minerals Ltd. and Total Energold Corporation continued advanced exploration work on the LOGAN property (31). The 1988 program consisted of 6 400 m of diamond drilling, backhoe trenching and both geochemical and geophysical surveys designed to test targets on strike from the main zone. With additional reserves identified at depth, the main zone of the Logan deposit contains an estimated 12.24 million t grading 6.17 per cent zinc and 26.4 g of silver per t and includes 8.07 million t amendable to open-pit mining. A preliminary economic evaluation of the property was underway at year end.

Fairfield Minerals Ltd. announced the discovery of an oxidized silver-lead zone, which was exposed in trenches on the TIM property (30), under option to Chevron Minerals Ltd. The oxide zone is up to 30 m wide. A sample taken across a 4-m width averaged 352.4 g of silver per t and 9.12 per cent lead.

In January 1988, Silver Hart Mines Ltd. announced plans to develop its HART (CMC) property (26). During the year, no exploration work was conducted on the property.

Archer, Cathro and Associates (1981) Ltd. conducted exploration work on the NITE (30) and GRAVEL properties (32) where silver-bearing veins are present.

Pak-Man Resources Ltd. and 2001 Resource Industries Ltd. drilled the LIZ and JEFF properties (30) located near the Tim property.

Southeastern Yukon

Canamax Resources Inc. completed 4 654 m in a 23-hole drill program on the North Hill zone of its MOUNT HUNDERE property (29), located north of Watson Lake. The North Hill zone is 3.2 km from the Jewelbox Hill area, where previous work outlined drill indicated reserves of 2.8 million t grading 12.9 per cent zinc, 8.4 per cent lead and 65 g of silver per t. The drilling on the North Hill zone cut several sections of skarn containing rich silver-lead-zinc mineralization. One hole intersected 10.8 m grading 4.62 per cent combined zinc-lead and 583 g of silver per t.

In December, Canamax Resources announced that the combined reserves of Jewelbox Hill and North Hill zones amount to 4.7 million t with an average grade of 13.3 per cent zinc, 5.3 per cent lead and 63.8 g of silver per t.

Tintina Trench

In January 1988, Golden Nevada Resources Ltd. and Noranda Inc. announced a spectacular drill intersection of 31.5 m averaging 11.66 g of gold per t and 150.9 g of silver per t on the GREW CREEK property (b). Following a small staking rush in late 1987 stimulated by the Grew Creek gold discovery, several properties along the Tintina Trench were staked and explored in 1988 for epithermal gold associated with Tertiary volcanics.

In June 1988, six of the 15 holes completed by Golden Nevada Resources on the Grew Creek property showed significant gold values. At year's end, reserves were reported at 505 000 t averaging 9.60 g of gold per t. In the Hoole River (24, 25) area, gold and arsenopyrite were found on several properties explored by Welcome North Mines Ltd.

Ketza-Seagull District

On the GROUNDHOG property (33), Yukon Minerals Corporation drove a 300-m long exploration adit and completed approximately 2 300 m of diamond drilling. Estimated reserves in the No. 2 and No. 3 veins were 273 000 t grading 7.5 per cent combined lead and zinc and 137.1 g of silver per t.

Equity Silver Mines Ltd., under agreement with Fairfield Minerals Ltd., drill tested five areas on the RAM property (33) with 31 holes totalling 3 723 m. The drill program returned one intersection of 0.4 g of gold per t and 32.7 g of silver per t over 17.4 m and a second intersection of 1.24 g of gold per t over 3 m.

On Cominco Ltd.'s TAY-LP property (33), Pacific Comox Resources Ltd. drilled six holes totalling 847 m to test arsenic anomalies on strike of a known gold bearing vein system. The best hole intersected three zones, one of which assayed 6.2 g of gold per t over 5.0 m.

Macmillan Pass Area

Cominco Ltd. optioned Hudson Bay Mining and Smelting Co.'s TOM property (36) near Macmillan Pass and commenced a two-year drilling program to extend the reserves of the Tom deposit. Three of four deep holes totalling 2 224 m penetrated lead-zinc-silver-barite mineralization on the down-dip extension of the west zone of the Tom deposit. The reserves of the Tom deposit amount to 9 283 700 t with an average grade of 6.19 per cent lead, 7.49 per cent zinc and 69.4 g of silver per t.

Keno Hill District

In the Elsa area (a), United Keno Hill Mines Ltd. drilled 14 766 m in 316 holes to test 11 targets for high grade silver-lead ore. Numerous ore intersections were returned from 25 holes drilled in the Townsite 34 vein. Several high grade veins were also intersected in the Webfoot area. Five holes were drilled to test the northern strike extension of the Silver King vein. Three of these holes assayed in excess of 1 700 g of silver per t over 1.5-m widths.

West of Keno Hill district, Arctex Engineering Services Ltd. explored the HAWTHORNE property (9) for R. Riepe. Chip samples taken from quartz veins adjacent to the SCHEELITE DOME returned values as high as 63.4 g of gold per t and 674.7 g of silver per t. Similar veins occur on Queenstake Resource's DUBLIN GULCH property (10), where Can Pro Development Ltd. drilled five of the more promising veins. In the CATTO vein, intersections of 3.5 g of gold per t across 1.6 m and 11.2 g of gold per t across 2.7 m were reported. The PATRICIA vein returned similar grades over narrower widths. A new vein system returned 41.1 g of gold per t over a 1-m chip sample width.

Nash Creek Area

Drilling on NDU Resource's MARG property (39), 32 km northeast of Keno City, outlined 2.28 million t of indicated and probable reserves grading 2.0 per cent copper, 2.60 per cent lead, 5.1 per cent zinc, 65.1 g of silver per t and 1.03 g of gold per t. The 21-hole drill project was targeted on or near lead and arsenic anomalies and EM conductors. The discovery was located near a lead geochemical anomaly identified by a Geological Survey of Canada survey in the 1960s.

On the NICK property (44), an unusual shale-hosted, nickel-platinum deposit was investigated by Archer, Cathro and Associates (1981) Ltd. for NDU and Pak-Man Resources Ltd. Work in 1988 included geochemical sampling and four drill holes totalling 362 m.

On NDU Resource's BLENDE property (38), fault controlled breccia zones in dolomite contain zinc and lead. The best of a three-hole program totalling 718 m intersected 86.3 m grading 9.1 per cent combined lead-zinc and 106.3 g of silver per t.

Mines and Mineral Activities

Northwest Territories

Mineral Production

In 1988, mineral production in the Northwest Territories was derived principally from seven hard rock mines comprised of four gold mines and three zinc-lead-(silver) mines. The largest mine in the N.W.T., the Pine Point Mine, processed its last ore on April 6, 1988. At its peak production, the mine employed over 650 workers and accounted for close to 16 per cent of the N.W.T.'s total value of mineral production. In April, Treminco Resources brought the small Ptarmigan Mine, a former gold producer, back into production.

The value of mineral production in the N.W.T. was estimated at \$766 million in 1988 compared with \$713 million a year earlier. Much of the increase was due to higher zinc production and a steady rise in zinc prices during the year. With the closing of mill production at the Pine Point Mine in the first half of the year, the output of lead was reduced appreciably. Gold production value followed the downward trend of gold prices in 1988. Together zinc and lead production accounted for 71 per cent of the total value of mineral shipments while gold production accounted for 26 per cent.

During 1988, the most important mining development was the commissioning of Giant Yellowknife Mine's \$25 million tailings re-treatment plant. It is designed to process 7 300 t of tailings per day and to recover about one half of the 2.3 g of gold per t contained in the Giant Mine tailings. Neptune Resources Corp. proceeded with construction of 9 000 t per day mill and open-pit mine project on its COLOMAC property, north of Indin Lake. Total construction and pre-production costs will be in excess of \$150 million. In November, Treminco Resources Ltd. started work on a new head frame for the Ptarmigan mine shaft. Also, Noranda Inc. and Total Energold Corporation started a two-year, \$35 million underground exploration program on the TUNDRA (FAT) property in the Courageous Lake area.

The mineral industry in the N.W.T. accounted for 23.1 per cent of the zinc, 20.2 per cent of the lead, 8.9 per cent of the gold and 1.8 per cent of the silver produced in Canada in 1988. The value of these metals combined with by-product bismuth and cadmium accounted for 5.5 per cent of Canada's metallic mineral production in 1988 compared with 6.4 per cent in 1987.

Operating mines in the N.W.T. directly employed 1 848 persons during 1988 compared with 2 110 in 1987.

Mines

Canada Tungsten Mining Corporation Limited, Cantung Mine

The Cantung mine at Tungsten remained on a care-and-maintenance basis throughout 1988. The company announced that detailed plans for re-starting and operating the mine are ready for implementation when tungsten markets improve. The mine closed in August 1986 because of low world tungsten prices.

Cominco Ltd., Polaris Mine

The Polaris zinc-lead mine (b) on Little Cornwallis Island, is the western world's most northerly base metal mine. During 1988, Cominco Ltd. sold a 45 per cent interest in the Polaris mine to Pine Point Mines Ltd. Cominco continues to operate the mine and market its concentrate production on behalf of both companies.

Polaris achieved record production in 1988 by mining and milling 1 016 000 t of ore to produce 220 400 t of zinc concentrate with an average grade of 61.2 per cent zinc and 44 000 t of lead concentrate with an average grade of 77.9 per cent lead. Ice conditions for the 1988 shipping season were favourable and 10 concentrate vessels and two freight vessels were handled from July 15 to October 19.

Type:	underground
Location:	Little Cornwallis Island (120 km northwest of Resolute)
Product:	zinc, lead
Mill Capacity:	2 100 – 3 100 tpd
Tonnes Milled:	1 016 000 t
Reserves:	14.0 million t (December 31, 1988)
Reserve Grade:	14.2 % zinc and 3.8 % lead
Employees:	272 (December 31, 1988)

Table 3:
Mineral Production of Operating Mines in the Northwest Territories, 1986, 1987, 1988
and Employment, 1988

Company, Mine and Commodity	1986		1987		1988(P)		Number of Employees (1)
	t	kg	t	kg	t	kg	
<i>Canada Tungsten Mining Corporation Limited</i>							
tungsten trioxide	1 782	-----	nil*		nil*		nil*
<i>Cominco Ltd.</i>							
Polaris Mine							
zinc	114 000	-----	128 800	-----	134 800	-----	272
lead	25 000	-----	26 500	-----	34 200	-----	
<i>Echo Bay Mines</i>							
Lupin Mine							
gold	-----	6 069	-----	6 006	-----	6 297	409
silver	-----	995	-----	882	-----	N/A	
<i>Giant Yellowknife Mines Ltd.</i>							
Giant Mine							
gold	-----	1 993	-----	2 380	-----	2 013	437
silver	-----	767	-----	N/A	-----	N/A	
<i>Salmita Mine</i>							
gold	-----	1 529	-----	545	-----	nil*	nil*
silver	-----	247	-----	114	-----	nil*	
<i>Nanisivik Mines Ltd.</i>							
zinc	60 241	-----	57 900	-----	63 100	-----	200
lead	3 528	-----	2 500	-----	1 000	-----	
silver	-----	25 372	-----	23 000	-----	22 200	
<i>Nerco Con Mine Ltd.</i>							
Con Mine							
gold	-----	2 777	-----	2 576	-----	2 551	502
silver	-----	574	-----	622	-----	510	
<i>Pine Point Mines Ltd.</i>							
zinc	238 625	-----	287 682	-----	81 748	-----	112
lead	109 815	-----	114 185	-----	26 028	-----	
<i>Treminco Resources Ltd.</i>							
gold	-----	72	-----	102.2	-----	258.2	28
silver	-----	N/A	-----	10	-----	N/A	
TOTAL							1 848

Source: Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

N/A = Not available -- = nil nil* = mine closed
(P) = Preliminary (1) = number of employees at year end 1988

Echo Bay Mines Ltd., Lupin Mine

The Lupin gold mine (d) is located 90 km south of the Arctic Circle and approximately 400 km northeast of Yellowknife. In 1988, the Lupin mill processed 1 687 t of ore per day with an average grade of 10.59 g of gold per t. This compares with 1 686 t of ore per day and 10.29 g of gold per t a year earlier. In September 1988, the company renewed a shaft deepening program at a depth of 778 m. By year end the shaft had been sunk to a depth of 890 m. A new access level was driven to establish the continuity of the ore deposit at depth.

Type:	underground
Location:	400 km northeast of Yellowknife
Product:	gold
Mill Capacity:	1 600 – 2 000 tpd
Tonnes Milled:	1 687 tpd
Reserves:	3.57 million t (December 31, 1988)
Reserve Grade:	10.89 g/t gold
Employees:	409

Giant Yellowknife Mines Ltd., Giant Mine

The mill at the Giant gold mine (a) processed 328 691 t of ore with an average grade of 7.31 g of gold per t for an output of 2 012.6 kg of gold. This compares with 338 655 t averaging 8.09 g of gold per t and an output of 2 379.9 kg of gold a year earlier. Lower ore grades in 1988 were due to increased production for open-pits (43.5 per cent of ore) to compensate for a tonnage shortfall from underground workings and generally, a lower grade of ore from underground workings.

On May 1, 1988, the company commissioned its \$25 million tailings re-treatment plant and related facilities. The plant is designed to process 7 300 t of tailings per day and has an expected life of six years of seasonal processing based on 1987 tailings reserves. The re-treatment plant produced 210.9 kg of gold from 857 132 t of tailings before closing on October 21 as cold weather set in.

Type:	underground with small open-pits on surface
Location:	2.4 km north of Yellowknife
Product:	gold
Mill Capacity:	1 000 tpd
Tonnes Milled:	328 691 t
Reserves:	1.0 million t (December 31, 1988)
Reserve Grade:	8.54 g/t gold
Employees:	437

Tailings Re-treatment Plant

Capacity:	7 300 tpd
Tonnes Processed:	857 132 t
Reserves:	6.08 million t (December 31, 1988)
Reserve Grade:	2.4 g/t gold

Nanisivik Mines Ltd., Nanisivik Mine

Production at the Nanisivik Mine (d) in 1988 amounted to 676 000 t of ore grading 9.7 per cent zinc, 0.4 per cent lead and 40 g of silver per t. This mill throughput resulted in an output of 63 100 t of zinc contained in 113 100 t of concentrate, 1 000 t of lead contained in 1 700 t of concentrate and 22 000 kg of silver. Approximately half of the mill feed came from the main lens deposit and the rest from the lower lens and satellite deposits.

Six concentrate shipments were made during the Arctic marine navigation season in 1988. The total concentrate shipments were the largest since 1983 and nine per cent more than in 1987.

Type:	underground
Location:	27 km east of Arctic Bay, Baffin Island
Product:	zinc, lead, silver
Mill Capacity:	2 000 tpd
Tonnes Milled:	676 000 t
Reserves:	2.53 million t (December 31, 1988)
Reserve Grade:	10.1% zinc, 0.4% lead, 45 g/t silver
Employees:	200

Nerco Con Mine Ltd., Con Mine

The Nerco Con mine (a) celebrated its 50th anniversary in August 1988. This mine was the original gold mine in Yellowknife when it started production in September 1938 under the Consolidated Mining and Smelting Co. Ltd. (now Cominco Ltd.)

The Con Mine produced 2 551 kg of gold and 510 kg of silver from 207 097 t of ore milled in 1988. In 1987, the company produced 2 576 kg of gold and 622 kg of silver.

Type:	underground
Location:	1.4 km south of Yellowknife
Product:	gold, silver
Mill Capacity:	675 tpd
Tonnes Milled:	207 097 t
Reserves:	2.26 million t (December 31, 1987)
Reserve Grade:	10.42 g/t gold
Employees:	502

Pine Point Mines Limited, Pine Point Mine

Mining at the Pine Point zinc-lead mine (e) was discontinued during the summer of 1987. However, the mill continued to process stockpiled ore until the ore was depleted in April 1988 at which time mill operations ceased permanently. Shipments from the concentrate stockpile on the mine property should be completed in 1991. The town of Pine Point was closed and abandonment and restoration activities were proceeding during the year.

Mill production amounted to 137 400 t of zinc concentrate with an average grade of 59.3 per cent zinc and 33 200 t of lead concentrate with average grade of 78.4 per cent lead. The ore milled amounted to 888 300 t with an average grade of 9.7 per cent zinc and 3.3 per cent lead. This compared with 3 187 000 t grading 9.6 per cent zinc and 3.9 per cent lead a year earlier.

Type:	open-pit
Location:	Pine Point
Product:	zinc, lead
Mill Capacity:	9 100 tpd
Tonnes Milled:	888 300 t
Reserves:	750 000 t (December 31, 1987)
Reserve Grade:	10.4 % zinc, 3.4 % lead
Employees:	12 (December 31, 1988)

Tremanco Resources Ltd., Ptarmigan Mine

The company brought the Ptarmigan gold mine (a) into production on April 1. From April 1, 1988, to January 31, 1989, 23 385 t of ore was trucked and processed at Giant Yellowknife's mill to produce 416.5 kg of gold.

During the year, the 900 foot-deep Ptarmigan shaft was re-equipped with a new head frame and hoist to provide access to the third level. The first two levels are accessed by a decline. The company plans to complete construction of a 180 t-per-day mill on the Ptarmigan mine site by June 1989.

The company's Tom gold mine, located near the Ptarmigan mine, was re-opened in July and a decline was driven to the second level. At year's end, the mine had reserves of 18 140 t grading 12.08 g of gold per t.

Type:	underground
Location:	20 km east of Yellowknife
Product:	gold
Mill Capacity:	nil
Tonnes Milled:	23 385 t (to January 31, 1989)
Reserves:	127 000 t (December 31, 1987)
Reserve Grade:	13.0 g/t gold
Employees:	28

Development

During 1988, Giant Yellowknife Mines Ltd. expended \$20.2 million on construction of its tailings re-treatment plant and related facilities. The plant is located at the Giant Mine and is designed to treat 6.4 million t of tailings grading 2.3 g of gold per t over a period of six years. It commenced production in May 1988. It will normally operate from May to the end of October.

Neptune Resources Corp. began construction of a 9 020 t per day mill to service its Colomac gold property (3) located north of Indin Lake, 212 km north-northwest of Yellowknife. Supplies and equipment were brought to the site in the spring of 1988 by winter road at a cost of \$10 million. With proven and probable open-pit reserves of 25.5 million t grading 1.9 g of gold per t, Neptune Resources plans to start production in 1990. The mine and mill project will cost over \$150 million. The plant is designed to produce 6 200 kg of gold annually and reserves are sufficient to sustain production for eight years.

Noranda Inc. and Total Energold Corporation started a two-year \$35 million underground exploration program on the TUNDRA project (13). The drill-defined potential in-situ reserves of the Tundra deposit amount to 29.5 million t averaging 6.86 g of gold per t with lesser contained tonnages at higher cut-off grades. The joint venture commenced sinking a 457-m vertical shaft in July 1988 and completion was expected in mid-April 1989. Following sinking of the shaft, an extensive underground development program with drifts and raises will be conducted to provide stations for underground exploration drilling. By the end of 1989, the joint venture partners expect to complete a mine feasibility study.

Urangesellschaft Canada Ltd. commissioned a pre-feasibility study of its KIGGAVIK (LONE GULL) uranium property, located 75 km west of Baker Lake (60). The resulting study indicated that the deposits could support a 1 000 t per day mill with an average grade of ore containing 0.5 per cent U_3O_8 . The company plans to obtain environmental approvals and begin construction of the mine facilities in the 1990s. The mine is expected to operate from 1994 to 2004, with a possible extension beyond 2004.

The project is being reviewed by a Federal Environmental Assessment Review Office (FEARO) panel and public consultations will take place in 1989. During 1988, the company conducted environmental baseline studies and completed 4 070 m of geotechnical drilling to evaluate ground conditions at potential construction sites.

Mineral Exploration

Exploration expenditures in the N.W.T. were estimated at approximately \$112 million in 1988. At least 157 properties were explored and 69 of these were drilled. Gold continued to be the leading target commodity. Most of the gold exploration was directed to properties in Slave Structural Province, north of Great Slave Lake, where 46 properties were drilled and another 43 properties were explored without drilling. In Keewatin District, the Archean Kaminak volcanic belt (south and west of Rankin Inlet) and Proterozoic rocks in the Baker Lake area were targeted for gold. Seven gold properties were drilled and 19 were explored without drilling.

Platinum was the second target commodity after gold. Thirteen projects were directed to platinum group metals. Uranium exploration was limited to three projects in Bear Structural Province, in an area east and southeast of Great Bear Lake, and five projects in the Keewatin District, in the area west of Baker Lake. Lead-zinc exploration was confined to drilling near the Nanisivik and Polaris mines in the high Arctic. The former producing EL BONANZA silver property was drilled for silver.

Among promising exploration projects, two polymetallic (silver-zinc-lead-gold) deposits were explored by drilling in the Beaulieu River (12) volcanic belt on properties held by Aber Resources Ltd. and Silver Hart Mines Ltd. A gold deposit was defined by drilling on Athabasca Gold's NICHOLAS LAKE (5) property.





MINERAL EXPLORATION AND MINING NORTHWEST TERRITORIES — 1988

LEGEND



Producing Mines

- a Giant Yellowknife Mines Ltd., Au, Ag
Nerco Ltd. (Con Mine), Au, Ag
Treminco Resources Ltd., Au, Ag
- b Cominco Ltd., (Polaris Mine), Pb, Zn
- c Nanisivik Mines Ltd., Pb, Zn, Ag
- d Echo Bay Mines Ltd., (Lupin Mine), Au, Ag
- e Pine Point Mines Ltd., Pb, Zn



Road



Areas of Exploration Activity
Refer to N.W.T. Table and Text



URANIUM



GOLD, SILVER



ZINC, LEAD, COPPER



PLATINUM



LITHIUM, DIAMOND, BARITE, IRON
BERYLLIUM, SOAPSTONE

Table 4
Mineral Claims in N.W.T.: Recorded, Cancelled
and in Good Standing, 1987 and 1988

	1988	1987
Recorded		
No. of Claims	1 098	838
Area in Hectares	739 928	552 385
Cancelled		
No. of Claims	4 448	6 031
Area in Hectares	464 348	430 657
In Good Standing (December 31)		
No. of Claims	16 702	20 052
Area Hectares	3 115 983	2 829 503

Because of block staking in the N.W.T., a claim may range from 20 to 1 000 hectares. The net result of claim staking and claim lapsing during 1988 was that 3 350 fewer claims were in good standing at year end. However, those in good standing covered 285 580 more hectares than in the previous year.

Exploration Projects

Southern Slave Structural Province *Yellowknife and Clan Lake Volcanic Belts*

Among gold projects, Canamax Resources Inc. drilled the NOSE claims (5) in the Clan Lake volcanic belt, 45 km north of Yellowknife. Golden Marlin Resources Ltd. completed an induced polarization survey on the MARLIN claims (a) on Yellowknife Bay. Nathan Minerals Inc. drilled the PRO and ANNE claims (a) north of Yellowknife. Noranda Exploration drilled the BELL 3 claim (5) near Sito Lake, north of Yellowknife. Pamorex Minerals Inc. drilled the PRN 2 and VARGA 2, 1 claim north of Yellowknife (a). However, four widely spaced holes totalling 447 m did not intersect significant gold values. Pacific Trans-Ocean Resources Ltd. completed two drill programs east of the Clan Lake volcanic belt on the PTX claim (6), northwest of Gordon Lake.

Athabaska Gold Resources Ltd. reported several good gold intersections from drill holes on the NICHOLAS LAKE property (NIC claims) (5), under option from Chevron Minerals. Out of nine holes reported in November 1988, the best 13 intersections averaged 24.0 g of gold per t over a width of 1.7 m. Most of the intersections occur in steeply dipping quartz veins. In February 1989, drill indicated reserves were reported at approximately 544 000 t grading 13.03 g of gold per t.

Yellowknife Supracrustal Basin

East of Yellowknife, the principal targets for gold were located in turbidite-hosted veins. Ardic Exploration and Development Ltd. in joint venture with Consolidated Thompson-Lundmark Gold Mines Ltd., continued drilling the past-producing Thompson-Lundmark gold mine property (6). The 1987 drill program was directed to testing extensions of the Kim vein and the previously unexplored Trail vein. In 1988, the drill target was a series of auriferous quartz lenses hosted in metasediments.

Canamax Resources Inc. drilled the TORO 1,2 claims (5) near Hook Lake. Hidden Lake Gold Mines Ltd. trenched and sampled the RUTH, RUTH NORTH and CHRISTINA 1 claims south of Gordon Lake (7). Treasure Island Resources Corp. drilled the JOON 2 claims (7). Both the Ruth North and Joon claims are former gold-producing properties.

Russell-Slemon Lakes Area

The principal target in this area was gold in amphibolitic sulphide-facies iron formation. Aber Resources Ltd. drilled on the CON claim (4) at the northeast end of Russell Lake. Asamera Minerals Inc. drilled the JANELLE 1 claim (4) on the north end of Russell Lake. Noranda Exploration Company Ltd. drilled the LEMON and RUSS 1 claims (4), north of Slemon Lake and west of Russell Lake respectively. Prolific Resources Ltd. drilled 925 m on the TOM and BAN claims at the southwest end of Russell Lake (4).

Beaulieu River Volcanic Belt

Aber Resources Ltd. and Hemisphere Development Corp. announced in January 1988 that drilling on the jointly-owned SUNRISE Lake property (12), 112 km east northeast of Yellowknife, indicated an important polymetallic sulphide deposit. In 1987, a 15-hole drill program totalling 1 542 m was completed. In 1988, further drilling outlined probable and possible geological reserves of 1 868 800 t grading 8.9 per cent zinc, 4.2 per cent lead, 404.6 g of silver per t and 1.03 g of gold per t. The reserves were calculated to a vertical depth of 664 m and the deposit is open at depth.

On the nearby BEAR 1,2 claims (12), Silver Hart Mines Ltd. drill tested two polymetallic sulphide zones similar in character to Aber's Sunrise Lake deposit described above. The zones are located several hundred metres to the east of the Sunrise Lake deposit. The BEAR sulphide zones were reported to contain 809 200 t with an average grade of 6.11 per cent zinc, 2.32 per cent lead, 220 g of silver per t and 0.89 g of gold per t.

Courageous-Mackay Lakes Volcanic Belt

On the past-producing SALMITA gold mine property (13), Giant Yellowknife Mines Ltd. drilled 14 surface holes totalling 9 000 m to test the favourable volcanic-sedimentary contact which hosted the recently depleted Salmita gold deposit. Several narrow zones of encouraging gold values were intersected, but grades and widths were not sufficient to warrant further investigation.

Noranda Exploration Co. Ltd. and Total Energold Corporation conducted a major exploration/development program on the TUNDRA property (13). This program is described in this report under "Development".

Other exploration projects with drilling in the region were conducted by Bow Valley Industries Ltd. on the KR and TONY claims (13) and by Gunnar Gold – Mill City Gold on the MOG I-4 claims (13).

Indin Lake Belt

Neptune Resources Ltd. carried out fill-in drilling on its COLOMAC property (3) between zones two and three. The company announced in January 1989 that mineable ore reserves had been increased from 14.5 million t containing 31 103 kg of gold to 25.4 million t containing 48 521 kg of gold. Neptune plans to continue its drilling program in 1989 on the Colomac and Goldcrest deposits.

Golden Rule Resources Ltd. drilled on the ARSENO 2 and NORTH 2,7 claims (3), that were optioned from Lintex Minerals. The claims are located near the Leta Arm of Indin Lake.

Treasure Island Resources Ltd. drilled on the PEGLEG claim west of Spider Lake (3).

Other Areas of Southern Slave Structural Province

Among other companies with drill projects, Continental Pacific Resources Ltd. drilled on the ZEUS 2, GLEN 1 and LARK 1 claims (12) at Payne Lake. Lawrence Mining Corp. drilled on the JIM 1,2 claims (5) at Brown Lake and Viscount Resources Ltd. completed a geophysical survey and drill program on the JAY 2 claim (12) at Spencer Lake.

Northern Slave Structural Province

Among companies that conducted drill projects and/or geophysical surveys, Argus Resources Ltd. drilled on the MUSKOX claims (24) north of Thistle Lake to test conductive iron formation. Encouraging gold assays were obtained from the iron formation by surface sampling.

In northeastern Slave Province, Chevron Minerals Ltd. and Galveston Resources Ltd. drilled gold showings in iron formation on the LB claims (28).

Several localities in the George Lake area (23) were drilled by the Back River Joint Venture. In the Ellice River area (53), geophysical surveys were completed. In the Malley Rapids area (25), the joint venture conducted airborne geophysical surveys.

BPH-Utah Mines Ltd. conducted geophysical surveys to test sulphide-bearing volcanics on the TAK claims (19) and on the CROWN claims (20).

Bow Valley Industries Ltd. conducted ground geophysical surveys on the BINGO 1,2, NDR and TAN claims (d), as a follow-up to an airborne geophysical survey. The company also drilled iron formation on the OP claims (d), optioned from O.P. Resources Ltd.

Chevron Minerals Ltd. drilled iron formation on the Pistol Lake property (22) (FARN and KNUT claims) and trenched auriferous zones on the TURNER, TURN claim groups (22). The company also explored the extensive Hood River property (22). These properties were optioned by Chevron Minerals from Silver Hart Mines Ltd. Silver Hart reported geological resources on the Pistol Lake property of 490 000 t with an average grade of 12.69 g of gold per t. On the Turner Lake property, resources amount to 1.179 million t grading 5.35 g of gold per t.

Cody Hawk Resources Ltd. tested iron formation on the ROE and GAS 300 property (26) by VLF-EM and magnetometer surveys. The GAS 300 claim was optioned from Cominco Ltd.

Cogema Ltd. conducted a geophysical survey on the SEB 1 claim (d) on the eastern shore of Contwoyto Lake.

Cominco Ltd. conducted an airborne geophysical survey over the COCO 1-9 claims (d) east of Contwoyto Lake to delineate iron formation. Cominco followed-up the airborne geophysical survey of the REN claims (16) near Itchen Lake by a ground geophysical survey and a drill program.

The Cominco-Cogema Joint Venture performed ground geophysical surveys and drilling to test iron formation on the AV, CTL, DIGGER, JON and PTC claims (17) west of Contwoyto Lake. On the east side of the lake, the GOLD claims (d) were explored by geophysical surveys.

Contwoyto Goldfields Ltd. performed geophysical surveys on the IF 1, 3 and BUCKET claim block (17) west of Contwoyto Lake in search of iron formation targets.

Echo Bay Mines Ltd. drilled on the Lupin mine lease (d) and on the DER 1 and PEN 1 claims to the south of the lease. The company also drilled iron formation on the CAR 9 claims (d) near Concession Lake, on the CUB 1 claim near Itchen Lake (18), and on the F1 claim near Leanne Lake (18).

Expeditor Resources Ltd. conducted magnetometer surveys on the TEC 13-16 (23), HY 1-3, 17-19 and TEC 1-12 claims (20) near the Hood River and on the TEC 7-9 claims at Casey Lake (25). North of Aitch Lake, a small line grid was surveyed by VLF-EM on Prospecting Permit 1144 (25). On the TEC 1-6 claims (23) in the Hackett River Volcanic Belt, ground magnetometer and VLF-EM surveys were completed as a follow-up to an airborne survey. The company also conducted magnetometer and VLF-EM surveys on the western side of the Back River volcanic complex (24), where it holds the HY 10-16 and HY 20-24 claims.

Hecla Mining Company of Canada Ltd. conducted geophysical surveys on the JOHN, SHIN, DLER, CAMP and ADD claim block (d) east of Contwoyto Lake. Selected targets were drilled.

Orofino Resources Ltd., in joint venture with Canuc Resources Ltd. and Dore-Norbaska Resources Ltd., drilled 40 holes totalling 3 000 m on the Arcadia property (21), on Coronation Gulf. The best results included a 23 m intersection grading 12 g of gold per t. Previously established geological reserves in two veins were estimated at 780 000 t grading 7.5 g of gold per t.

Pamorex Minerals Inc. drilled on the ALGOOD claims (25) and the JOYCE, TANIA and PATRICIA claims (26). Two short holes were drilled on the P claims (16), in the Itchen Lake-Point Lake area, that Pamorex optioned from Echo Bay Mines Ltd.

Windflower Mines Ltd. drilled an EM conductor on the NAT claim at Clinton-Colden Lake (27).

*Bear Structural Province
East Arm of Great Slave Lake*

At Thor Lake (63), Highwood Resources Ltd. and Hecla Mining Co., in a joint venture, drilled 2 100 m to test the yttrium and rare earth element potential of the Lake zone in the Blatchford Lake complex. The Thor Lake property contains reserves of 1.6 million t grading 0.76 per cent beryllium (Be).

William Kizan took a 300 kg sample of barite from the PEGGY K claim (62) for testing.

Raparee Resources Ltd. drilled 500 m in 10 holes on the FOX claims (8) Outpost Islands, the site of the past-producing Outpost Island gold mine.

Great Bear Lake Region

Exploration in Bear Province, southeast and east of Great Bear Lake, was directed to platinum group metals, uranium and silver.

Equinox Resources Ltd., in joint venture with Technigen Corporation conducted UT-EM surveys on the VALL and SPEE and MUSK claims on the Musk-ox intrusive complex (55). The target was platinum group metals. The joint venture completed a 1 200 m drill program but results were generally disappointing.

International Platinum Corporation conducted magnetometer and EM (UT-EM) surveys and drilled on the OX claims (55) on the Musk-ox intrusive complex, for platinum group metals.

CEGB Canada Exploration Ltd. drilled the "Damp" uranium-copper showing at Longtom Lake (58) on Prospecting Permit 1093 and explored in the Beaverlodge area (59). CEGB also explored the BULLWINKLE, BUD and CROSS claims in the Port Radium area (57) for uranium.

Octan Resources Ltd. drilled and trenched a property south of Port Radium (2) comprised of the EL BONANZA and BONANZA claims and other claims optioned from El Bonanza Mining Company Ltd. The latter company produced silver during the 1930s from the El Bonanza property. Octan acquired the mill and related facilities and the former silver producing mines of Terra Mines Ltd. in the Camsell River silver mining camp (2). These properties include the past-producing Silver Bear, Norex and Smallwood silver mines.

District of Keewatin and Part of Southeastern District of Mackenzie

Exploration in the district of Keewatin was directed to gold in the Archean Kaminak (Rankin-Ennadai) volcanic belt and to unconformity-type uranium deposits west of Baker Lake.

Borealis Exploration Ltd. drove a 330 m decline on its Fat Lake property (42) to a depth of 67 m. Drill proven geological reserves of the Fat Lake deposit were reported as 47 600 t averaging 11.14 g of gold per t to a vertical depth of 50 m. Exploration included 1 270 m of drilling and both ground magnetometer and VLF-EM surveys.

Claude Resources conducted a magnetometer survey near Sandy Beach Lake (36). Noranda Exploration Ltd. conducted IP surveys on claims in the Lothrop Lake area (37) that were optioned from Suncor Inc.

Dejour Mines Ltd. in joint venture with Nobel Peak Resources Ltd. completed a 10 350 m drill project on the Turquetil Lake properties (38). In August 1988, Dejour reported the best intersections, from 12 drill holes, yielded 4.31 g of gold per t over 38.2 m and 5.89 g of gold per t over 13.2 m.

Noble Peak Resources Ltd. completed a 3 350 m drill project on its Southwin project at Happy Lake (43), 144 km southwest of Rankin Inlet. The program yielded a 6.7 m intersection that assayed 8.89 g of gold per t. In the Quartzite Lake area (43), a 6 900 m drill project tested geophysical targets.

W.A. Hubacheck Consultants Ltd. explored gossans and associated EM conductors for gold in the Rochon Lake area (34) for Agnico Eagle Mines Ltd.

Sunmist Energy '86 Inc. continued exploration at Maguse Lake (39). The work included 3 050 m of drilling, VLF-EM, HL-EM and magnetometer surveys.

Sikaman Gold Resources Ltd. completed 16 drill holes totalling just over 1 000 m on its claims at Kaminak Lake (40) and at Maze Lake (43). The drilling targeted a number of EM anomalies which had been outlined by an airborne survey.

Canadian Nickel Co. Ltd. drilled 2 950 m and conducted a magnetometer survey on its IGLOO claims at Wilson Bay (44).

Pamorex Minerals Inc. drilled 1 045 m and conducted VLF-EM and magnetometer surveys on the SAM claims (31), west of Baker Lake.

Taiga Consultants Ltd. sampled uranium showings for gold and platinum group elements on permits held by Norgold Ltd. Attention was focused on Proterozoic felsic volcanic rocks on the Baker Lake (32) and Yathkyed Lake Basins (33). Comaplex Minerals Corp. also tested uranium showings for precious metals on its claims and prospecting permits in the Christopher Island area (45) east of Baker Lake.

Nonacho Basin

In the Nonacho Basin, southeast of Great Slave Lake (10), Kelmet Resources Ltd. acquired claims from PNC Canada Ltd. and Scurry-Rainbow Ltd. The company explored the area for unconformity-related, uranium-copper-gold-silver-platinum group element targets.

Also in the Nonacho Basin (10, 11), Fortune Minerals Ltd., Noranda Exploration Co. Ltd and William Kizan explored separate properties for gold.

Uranium Exploration

Exploration for unconformity-type uranium deposits was concentrated in the region west of Baker Lake.

Urangesellschaft Canada Ltd., in joint venture with PNC Exploration (Canada) Co. Ltd., completed 3 250 m of drilling and detailed resistivity, gravity and soil geochemical surveys on the SISSONS-SCHULTZ south property (60).

PNC Exploration (Canada) Co. Ltd. drilled 1 100 m on its SCHULTZ LAKE project (61). Work also included VLF-EM, gravity and detailed geochemical surveys.

CEGB Exploration Canada Ltd. explored areas of the Thelon Basin south of Aberdeen and Schultz lakes (60).

Nickel-Platinum Group Elements

Asamera Minerals Ltd., in joint venture with Comaplex Minerals Corp., drilled geophysical targets over the site of the past-producing Rankin Inlet nickel-copper mine (48). The drill program was designed to determine the platinum group element content of three zones of mineralization that had previously been located by North Rankin Nickel Mines. Comaplex Minerals Ltd. conducted magnetometer and Max-Min EM surveys on an extension of the mineralized zone.

Taiga Consultants Ltd., on behalf of Courageous Exploration Ltd. and Norman Minerals Ltd., conducted geochemical and VLF-EM surveys on permits and claims optioned from Comaplex Resources and Tempest Exploration Ltd. in the Snowbird-Ennadai volcanic belt (35).

Northern Commodities Overview

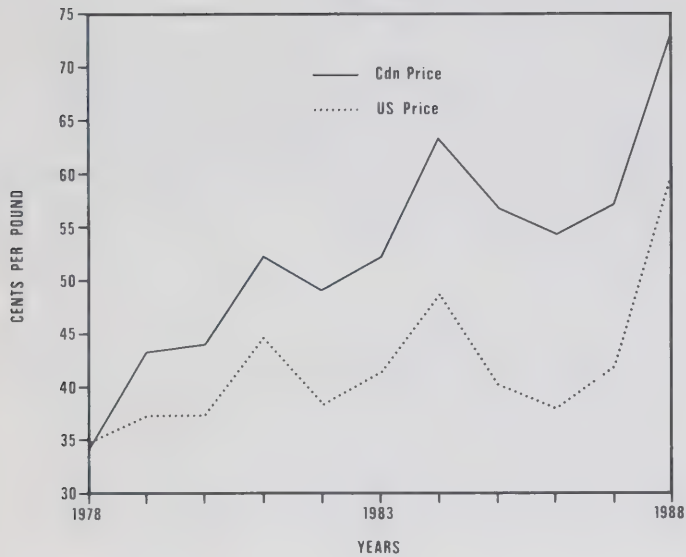
Zinc

In 1988, N.W.T. zinc production increased by 12.4 per cent over 1987 to reach 290 000 tonnes with a value of \$477 million. Yukon produced 118 300 tonnes (a decrease of 19.5 per cent from 1987) valued at \$194.9 million. The combined territories' production amounted to 32.6 per cent of Canadian zinc production. Strong demand and tight supply continued to push zinc prices upward throughout the year.

World mine production is not expected to change substantially until the early 1990s while zinc consumption is expected to continue to rise (at an average of approximately 1.3 per cent per annum) due to increasing use of galvanizing particularly in the automotive and construction industries.

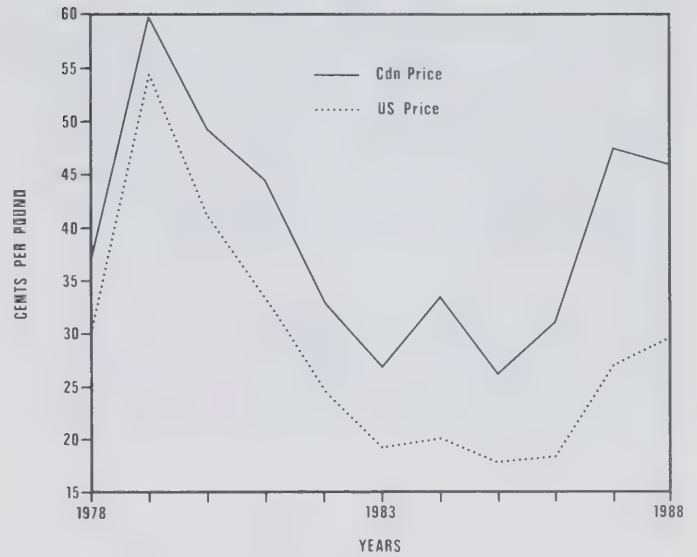
ZINC PRICES

1978 - 1988



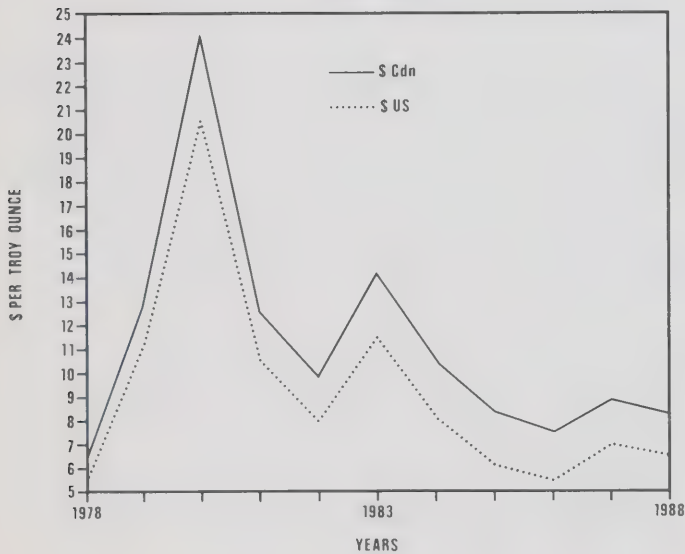
LEAD PRICES

1978 - 1988



SILVER PRICES

1978 - 1988



GOLD PRICES

1978 - 1988

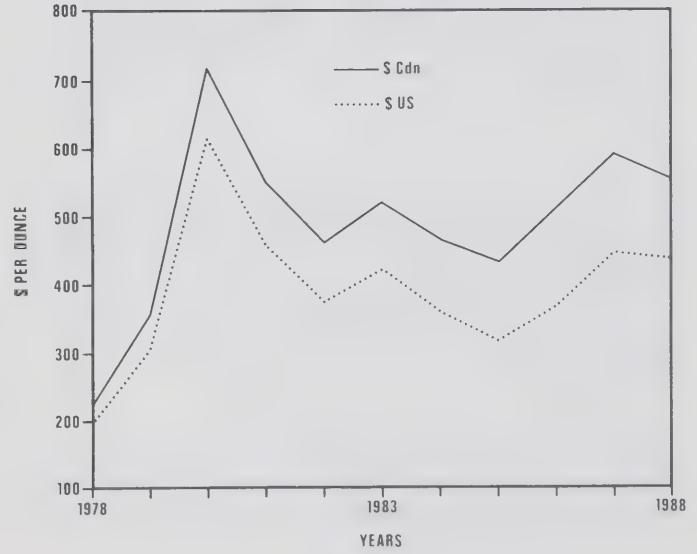


Figure 1 Metal Prices, 1978 - 1988

Lead

The N.W.T. lead production in 1988 was 67 200 tonnes (a 49 per cent decrease from 1987), with a value of \$67.2 million. In 1988, the Yukon produced 152 000 tonnes of lead (an increase of 52 per cent from 1987) valued at \$152 million. Combined territorial production amounted to 65.9 per cent of Canadian lead production. Lead prices remained stable and relatively strong throughout the year mainly due to good battery sales.

World supply of lead is expected to change little in 1989, but increases will begin in the early 1990's and consumption is expected to grow steadily. Prices should remain in the 66 cent per kilogram range in the near term.

Gold

The N.W.T. 1988 gold production dropped to 11.4 tonnes, a decrease of 2.7 per cent from 1987. Yukon production decreased as well by 7.9 per cent to 4.3 tonnes in 1988. The value of the N.W.T. and Yukon gold production was \$197.9 and \$74.6 million respectively in 1988. The combined value of territorial gold production represents 12.3 per cent of the value of Canadian gold production.

Silver

In 1988 Yukon silver production doubled from the previous year to reach 268 tonnes with a value of \$66.3 million. Production in the N.W.T. in 1988 also doubled to reach 27 tonnes with a value of \$6.8 million. The two territories' combined production of \$73.1 million amounted to 19.4 per cent of Canadian silver production.

Silver prices decreased in 1988 with large stocks still dampening any price rallies. The market is still characterized by production exceeding demand. In 1989 silver prices are expected to stay in the range of \$6-8.5 per troy ounce.

Pricing of Major Northern Metals

Zinc

The zinc industry during the 20th century has undergone four distinct demand growth periods. Although three of these periods have been characterized by strong growth, the fourth, from the middle 1970s to early 1980s was characterized by low growth and oversupply.

1900-1950

At the beginning of the century, western world zinc consumption was approximately 500,000 tons. This rose to 1.5 million tons by the beginning of World War II, reflecting increased industrial activity particularly in the use of galvanizing and brass. By 1950, zinc consumption reached two million tons, a four-fold increase in the first half of the century.

From 1900 to the beginning of World War II, zinc prices ranged from three to eight U.S. cents per pound. During World War I prices rose as high as 13 U.S. cents per pound.

1950-1973

The 1950-73 period was characterized by economic growth rates around the world of approximately 4.5 per cent, however, zinc demand rose at over 5 per cent per annum. The major increases in zinc consumption initially resulted from reconstruction of economies following the depression and Second World War. This was followed by the 1960s, a period of blossoming consumer spending.

During this period, galvanizing was the largest consumer of zinc. Its share of zinc consumption rose from approximately 30 per cent to 40 per cent. Initially galvanizing was used mainly for farm buildings and in household appliances. Automotive industry use was small. However, by the 1960s, galvanizing use in cars made the automotive sector a major consumer in North America.

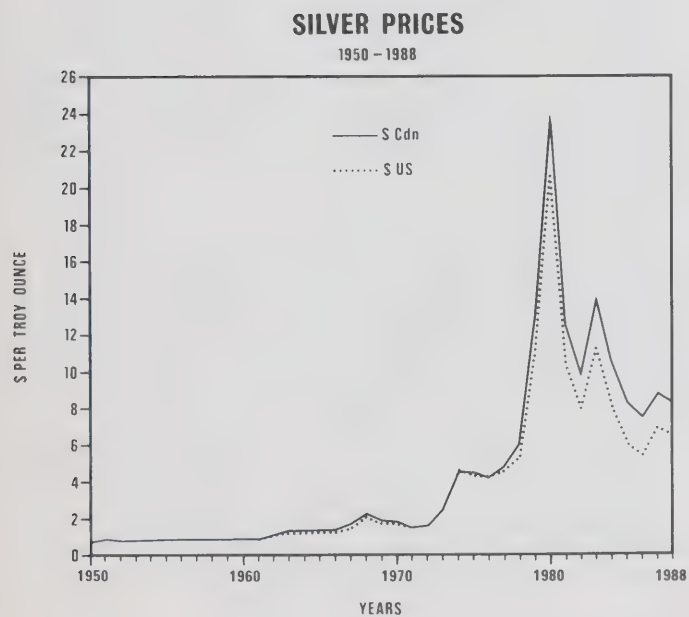
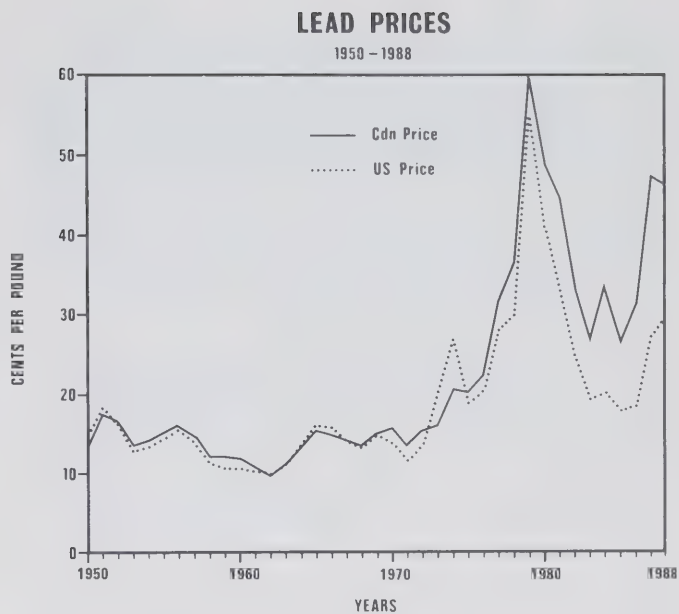
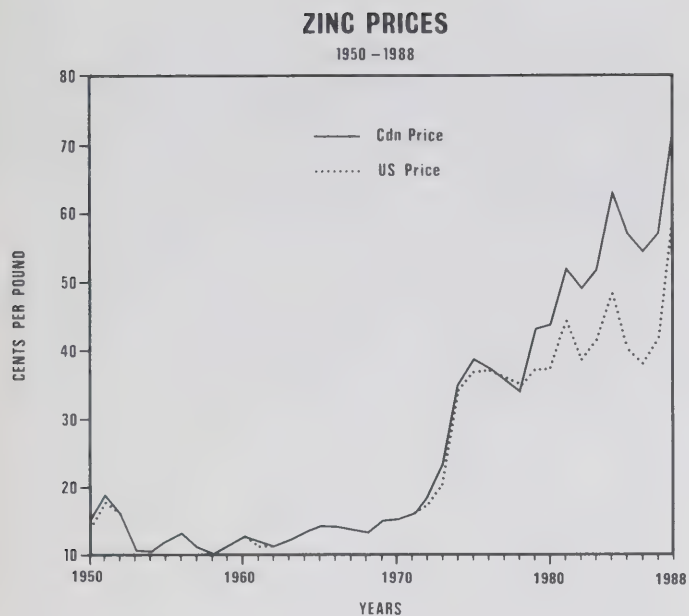


Figure 2 Metal Prices, 1950 - 1988

The next largest end-users of zinc were zinc die castings and brass, each providing approximately 20 to 25 per cent of zinc demand. Die castings, the fastest growing sector during the 1950s and 1960s, were primarily used in automotive parts, household appliance parts, machines and tools and plumbing/heating parts. Brass products included: sheet, strip, extruded and cast shapes, wire, pipe and rods. The remaining 25 per cent of demand was accounted for by semi-manufactured (strip and sheet) zinc, zinc oxides, dusts and chemicals.

From the early 1960s, castings and brass saw strong competition from alternate materials, mainly aluminum and plastics. New technology also led to more efficient use of material resulting in reduction in size and gauge which reduced the per unit amount of zinc consumed. However, increased overall demand increased zinc consumption.

Until 1973, mine capacity grew at or near the consumption rate. Existing operating mine capacity utilization was high and, in addition dormant mine capacity did not exist because of low rates of investment during the depression and the war years.

Increasing zinc consumption and supply, which moved in tandem, meant that the market was basically in balance. As shown in Figure 1, after World War II prices stepped up to the 10 cent range. Prices then rose until 1973 at, on average, 5 per cent per annum, which was equal to the growth rate of zinc consumption. Near the end of the period, zinc demand was growing so quickly that prices soared and it looked as though new mine capacity would not meet demand.

1974–1984

This period can best be described as a period of economic instability. Economic growth rates were much slower as a result of the end of the post-World War II reconstruction and industrialization, the saturation of the consumer goods markets and high inflation. The oil price shocks of the early 1970s further exacerbated the problem and led to major energy conservation measures which substantially impacted on metal demand. Growth in zinc demand slowed and even decreased in some years.

Zinc die castings were particularly hard hit as they were substituted for lighter materials (plastics and aluminum) in the automobile industry. This led to the development of the thin-walled die casts, with equal or better strength and much reduced quantities of zinc per unit. In other die casting markets, miniaturization and “thinning down” also occurred. The die casting share of zinc consumption fell from approximately 26 per cent in 1973 to 18 per cent by 1980. Improved galvanizing processes also reduced zinc requirements. However, the introduction of Galvalume in 1976 and Galfan in 1983, both zinc-aluminum galvanizing coatings, were two advances that helped maintain zinc consumption for galvanizing.

Chemicals and zinc dusts maintained their eight per cent of zinc demand despite falls in the industrial demand for zinc oxide in tires (radial plys with higher wear lives were developed) and as photocopying paper that did require coatings was developed. However, these declines were offset by large increases in chemicals/dusts demand in the newly industrialized countries.

Prices in 1973–74 took another step up to the 35 cent range as a result of two events: shortfalls in supply caused by strikes and shutdowns in major producer countries and rising prices due to demand exceeding smelting capacity.

During the late 1970s, annual supply exceeded or met demand but mine capacity was significantly above demand levels. Demand ranged from approximately 3.5 million tons (1975) to 5.5 million tons (1984), while capacities exceeded demand by some 46 per cent (1975) to 27 per cent (1984). Prices through the 1970s remained at the 35 U.S. cents per pound level despite substitution brought on by the energy crisis. This occurred because zinc supply was, and still is largely, controlled by large western country producers who historically have exercised greater discipline in zinc production than producers of other metals such as copper.

The basic oversupply during the 1970s and the poor economic conditions of the early 1980s led to relatively low prices. High interest rates in the early 1980s led to a large appreciation in the U.S. dollar and a collapse in metals prices.

1983–1988

The poor economic returns, due to low metal prices, in the early 1980s meant that little new zinc capacity was brought on line. However, 1983 zinc consumption has risen every year and by 1986 was at an all-time high. Demand in 1988 was exceeding supply and this is pushed prices upwards.

Consumption for zinc is still principally centred around galvanizing, brass and zinc die casting alloys. It is anticipated that galvanizing will, in the near future, be the primary growth sector mainly due to increased consumption by the automobile industry as it improves corrosion protection. Other uses for zinc are remaining relatively stable.

Lead

Lead went through the same four distinct phases as did zinc though price level changes were less dramatic (see Zinc Section). Lead has been faced with substantial substitution pressures and environmental and health concerns have also impacted on consumption.

1900–1950

Lead consumption began the century at nearly 900,000 tonnes and reached 1.6 million tonnes by World War II.

Initially, lead's principle use was in lead pigments, mainly for paints. By the Second World War, the largest use of lead was in batteries; cable sheathing was second. Of increasing importance, was the use of lead in tetraethyl compounds used as anti-knock agents in gasoline.

The supply of lead is met by two sources: primary or mine production and secondary or recycled production. Prior to World War II most lead supply was derived from mine production since, at that time, uses for recyclable lead were limited. Secondary production grew after the war.

Prices, prior to the Second World War, stayed in the range of four to six U.S. cents per pound, except during World War I and in the 1920's when prices went as high as nine U.S. cents per pound.

1950–1973

Until the early 1970s lead demand was strong, with growth rates averaging four per cent annually or slightly below Western World economic growth rates of 4.8 per cent.

Since World War II, lead's primary use has been in original equipment (OE) and replacement batteries for automobiles and commercial vehicles. Lead, hardened by antimony was used in battery grids and poles. From 1945 to 1974, consumption of lead for batteries rose from 28 to 45 per cent of total lead demand mainly due to the huge increase in car ownership.

By 1960, the second largest uses for lead were cable sheathing and rolled and extruded lead products, each accounting for 18 per cent of lead consumption. Rolled and extruded products included: lead piping (largely replaced by copper and plastics over the period); and rolled sheet and stripping for roofing, flashings and similar applications. In the 1960s, lead use as shielding against nuclear radiations in reactor installations also developed. The use of lead for cable sheathing fell almost continuously from 1960 because of competition from plastics and aluminum sheathings and had decreased to approximately 10 per cent by the early 1970s.

Gasoline additives and pigments/compounds each accounted for an increasing per centage of lead consumption moving from 10 to 12 per cent over the 1960 to 1973 period. By 1973, with the increasing use of unleaded gasoline, demand for lead as an additive fell. Pigments and compounds are used in polyvinyl chlorides (PVC) as stabilizers (to prevent degradation of PVC), glass, ceramics and paints.

During the 1960s and 1970s both the primary and secondary sources of lead production grew as primary production could not meet demand. By the early 1970s secondary lead accounted for approximately 40 per cent of lead production.

During the period from the end of World War II to the early 1970s, lead prices remained relatively unchanged at approximately 15 U.S. cents per pound, though yearly prices fluctuated substantially (see Graph 2). The lack of major price improvement is attributable to the loss of some major uses (cable sheathing, pigments, etc.) which limited the growth of lead use.

1973–1984

In the early 1970s high antimony (used to harden lead) prices and the first energy crisis led to the downsizing of batteries and a reduction in lead content. This situation was offset by increases in the number of vehicles and the development of new specialty markets (i.e. electrically-driven vehicles).

From 1973 to 1979, annual world consumption rates grew at only 0.5 per cent, mainly due to saturation of the automobile market, reduction in intensity of use, the energy crisis and growing environmental and health concerns associated with lead.

During this period, the supply from mines remained relatively constant at around 2.5 million tonnes a year. This occurred because lead is primarily a by-product of zinc and silver mining. Refined lead production capacities during this period exceeded demand. The secondary lead sector balanced supply and demand since secondary refiners could quickly start or stop operations as prices changed.

1980–1988

Lead experienced the same 1980 price collapse as other base metals. Since 1983, lead consumption has grown steadily and, in early 1987, surpassed the 1977 peak of 4.1 million tonnes.

The primary use for lead is now the production of batteries, which accounts for approximately 60 per cent of lead consumption. Research continues on the production of smaller batteries, but many technical limits are being reached and no viable alternative technology is yet apparent. Rolled and extruded lead uses also remain important while consumption will like to continue declining for a number of uses including: gasoline additives, cable sheathing, pigments and compounds and lead alloys (though at rates slower than those expected during the next two years). Increasing concerns associated with lead in automotive emissions, has led to the gradual elimination of lead additives in gasoline. However, forecasts indicate requirements of approximately 100 000 tonnes a year will exist into the early 1990s. In other areas, (cable sheathing, pigments, etc.), the effects of technological change and substitution have already been felt.

New lead supplies could be further affected if there is a spread in U.S. jurisdictions adopting mandatory battery recycling laws. No new major uses for lead have been developed. World lead consumption is thus forecast to remain near four million tonnes per year in the near future.

Lead and Zinc Structural Demand Change

A major shift in consumption has occurred in the last 15 years, which will affect future demands for zinc and lead as well as other base metals. This has been the emergence of outstanding metal consumption growth rates in the "Newly Industrialized Countries (NIC)" and developing countries. The increases now mean that the NIC account for approximately 20 per cent of non-ferrous metals demand.

This drastic increase in share has occurred since 1974. Prior to that year growth in metals demand was driven by demand in member countries of the Organization For Economic Co-operation and Development (OECD). In the case of base metals, copper and zinc consumption grew by approximately 50 per cent from 1962-1974, of which 40 of the 50 percentage points was contributed by the OECD countries.

From 1974 to 1986, the picture reversed with OECD growth being flat or negative and NIC/developing countries consumption rising at the same percentage rate as in the 1962-1974 period. This trend could be seen with zinc where the NIC/developing countries share rose from 15 to 30 per cent while OECD-nation consumption remained flat. Thus all demand growth for metals has been driven by the NIC/developing countries. The NIC and developing countries have become the higher metal intensive consumption economies and this trend will continue at least for the foreseeable future.

Gold

From 1900–1944, gold was the basis of the international monetary system. Each country fixed the value of its currency in terms of gold. After the Second World War, when international monetary arrangements were governed by the Bretton Woods Agreement (1944), the value of the U.S. dollar was set at \$U.S. 35 per ounce of gold, all other currencies had their exchange rates fixed against the U.S. dollar.

During the mid-1960s lack of confidence in the U.S. dollar led to an increase in the speculative demand for gold. In 1968, this led to the establishment of a “two-tier” pricing system for gold. The monetary value for gold remained fixed at \$U.S. 35 per ounce while its value for non-monetary purposes was determined by the free market. Increasing speculation against the U.S. dollar led to the revaluation of gold to \$U.S. 38 per ounce in 1971 and to \$U.S. 42.22 per ounce in 1973. In November 1973, the U.S. severed the link between the dollar and gold. Between 1974 and 1978, a general reform of the international monetary system ended the monetary role of gold. During this period, prices increased to the \$U.S. 150 to \$U.S. 200 level (see Figure 1). In 1980 the price peaked at just under \$U.S. 800 per ounce. Since then prices have fluctuated between \$U.S. 300 and \$U.S. 500 per ounce.

During the 1980s, 67 per cent of the western world gold supply came from western world mine production, 20 per cent from recycled scrap and 13 per cent from imports from centrally planned economies. A generally favourable gold price during this period led to an average increase in western world mine production of over five per cent. South Africa has for many years been the world’s largest producer; however, recent increases in production have occurred primarily in Canada, the U.S., Australia and Brazil.

Because of the large stocks of gold already in existence, it is the structure of the demand for gold which drives its price rather than the level of supply.

Of western world gold consumption today, jewellery fabrication accounts for 55 per cent, investment demand in the form of coins, wafers and bullion purchased by investors and central banks accounts for another 31 per cent and industrial fabrication for the remaining 14 per cent.

Industrial use is dominated by electronic applications and dental use. As such, the demand from this segment of the market is relatively stable and insensitive to fluctuations in gold price.

However, gold demand for jewellery fabrication, is sensitive to gold price fluctuations. As real gold prices rise in local currencies, jewellery fabrication tends to decline; and as real gold prices decline, jewellery fabrication increases. Because of this sensitivity to price changes, jewellery markets tend to act as a support for the price of gold at the lower end of its current trading range.

It is demand for gold as an investment which is the major determinant of gold price. The major influences which appear to stimulate investment demand for gold are a weakening U.S. dollar, rising commodity prices, and falling real (deflated) interest rates, inflation and global political instability. Conversely, a strong U.S. dollar, weak commodity prices and high real interest rates tend to depress investor demand for gold.

Silver

Like gold, silver has had a monetary role though less pronounced than gold. The silver market, unlike gold, during the 20th century has been a free market with the exception of from 1933 to 1963 when some price setting action took place. While the price of silver like the price of gold is influenced by investment demand the much larger per centage of industrial demand for silver makes it a more significant determinant of silver prices.

The free market price of silver from the beginning of this century to 1933 generally stayed within the range of 50 to 75 U.S. cents per troy ounce.

Between 1933 and 1963, the price of silver was influenced to a high degree by U.S. government intervention in the market. From 1933–45, a two-price system was in effect. The U.S. Treasury Department bought U.S. silver at a price which was the difference between the silver coinage value (\$U.S. 1.2929) and a service fee (seigniorage) charged by the U.S. Treasury. In addition, an open market price for foreign silver was set by the large New York silver trader Handy and Harman. During this period, the average price of silver in major world markets remained relatively stable fluctuating in a narrow range (from \$U.S. 0.646 to \$U.S. 0.9505). From 1946 to 1961, large annual deficiencies in silver production versus consumption led to a substantial decline in the silver stocks held by the U.S. Treasury Department.

In 1963, silver was freed from U.S. government control and the U.S. stock of 1.7 billion ounces of silver sold initially at \$U.S. 1.2929. Since the middle of 1967, silver prices have been set solely by market forces. Rising silver prices during the late 1960s forced governments to look for cheaper metals to replace silver in coinage (Canada converted to nickel in 1968).

Present Market

The present supply of silver comes from two sources: primary silver mines and as a by-product of other mining operations. Total western world silver production in 1988 was 11 500 tonnes. Only that silver which comes from primary silver mines, is price sensitive (approximately 30 per cent). The rest, which is not price sensitive, is produced as a by-product, primarily of lead-zinc or gold-silver operations. The per centage of by-product silver appears set to continue to increase in the early 1990s, with the development of a number of lead-zinc and gold mines which will have significant silver by-product production.

Silver demand is composed of industrial demand accounting for approximately 93 per cent and investment demand which accounts for the remaining seven per cent.

Prior to 1980, gold and silver prices tended to move in tandem responding to investor demand for precious metals. Both were seen as a store of wealth and as a hedge against inflation and currency fluctuations. Silver has been the individual's hedge against inflation in India and the Middle East, but also in the U.S. where, until recently, U.S. citizens could not hold gold. Stocks will flow from these individual holdings when prices are high or after natural or political disasters. The influence of these stocks on the supply of silver is compounded by significant western supply from silverware, hoards and family heirlooms which enter the market in times of high prices.

The major industrial use for silver is associated with the photographic industry which consumes 51 per cent of industrial demand silver. The second largest consumer (22 per cent) is the electrical and electronics sector. Three areas within the electrical sector promise increased silver demand: silver in windshields which permits for heated windshields; specular reflectors for fluorescent lighting fixtures; and silver-based military-type batteries. Jewellery accounts for approximately 15 per cent of silver consumption while brazing alloys and solder accounts for the remaining five per cent.

The 1979–80 price peak in silver (when prices reached \$U.S. 50 per ounce) was an aberration brought on by the Hunt brother's attempt to corner the silver market. This dramatically affected investor interest which did not recover until the stock market crash of 1987.

The jewellery and silverware sectors saw the largest drop in demand as a result of the 1970 price surges. Demand from 1978 to 1980 halved and is still half that of a decade ago. The silver price spike of 1979-80 also caused consumers to use their silver more efficiently and increase recycling. For example, the photographic industry, from the mid 1970s to 1988 has reduced silver requirements by 60 per cent with no quality deterioration.

Silver demand, at least in the short term, has stabilized but mine supply will continue to increase at least until the early 1990s. The increasing supply therefore should ensure that prices will not rise substantially above \$U.S. 5 to \$U.S. 6 per ounce in the near future.

Table 5:
Exploration – Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	Homestake	Forty Mile	Au
1		Fortymile River	Placer Au
2	Granges/Lode Resources	Sixtymile River	Placer Au
3	Berglynn	Klondike	Placer Au
3	Rise Resources/Gold City	Indian River	Placer Au
3	Arbor/Dawson Eldorado	Lone Star	Au
3	Esso Minerals	Sixtymile	Au, Zn, Pb, Cu
4	Queenstake	Stewart River	Placer Au
5	Homestake	Ballarat	Au
6	Chevron	Tombstone	Au, U
7	Noranda	Oro	Au, As
8	Danra	Zeta	Ag
8		Clear Creek	Placer Au
9	Arctex	Hawthorne	Au, Ag, Sb, W
10	Queenstake	Dublin Gulch	Au
10	Grandex	Mayo	Placer Au
11	Moosehorn	Reef	Au
12	Kerr Addison	Shadow	Au, Sb
13	Big Creek JV	Nucleus	Au
13	Big Creek JV	Revenue	Au
13	Rea Gold/Verdstone	Rag	Au, Ag
13	Rea Gold/Verdstone	Goldy	Au, Sb
13	Noranda	Emmons Hill	Au, Sb, Cu
13	Doron	Caribou Creek	Au
13	Big Creek JV	Antoniuk	Au
13	Mill City	Tinta Hill	Au, Cu, Ag, Pb, Zn
13		Dawson Range	Placer Au
13	Big Creek JV	Goldstar	Au
14	Freegold Venture	Tawa	Au, Ag
14	BYG Natural/Chevron	Mount Nansen	Au, Ag
14	Aurchem	Discovery Creek	Au, Ag, Pb, Zn
14	Noranda	Dows	Au
14	Chesbar/States Expl.	Vic	Au
14	Kerr Addison	Only	Au, Cu
15	Rexford/Kluane JV	Onion	Ni, Cu
15	Kluane JV	Arn	Au, Cu
16	Pezgold	Shut	Au, As
17	Pacific Trans-Ocean	Later	Au
17	New Era Developments	Red Ridge	Au, Ag, Pb, Zn
18	Omni	College Green	Au, Ag
19	B. Cofer	Rosbank	Au, Ag
20	Dunvegan	Jube	Au, Pb, Cu
21	L. Carlyle/D. MacDonald	BM	Au, Cu
21	Anooraq	Evelyn Creek	Rho

Table 5 (continued)
Exploration – Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
22		Livingstone Creek	Placer Au
23	Prime Expl./Internat. Rhodes	Ran	Au
23	Welcome North	WLN	Au
23	Welcome North	Tint	Au
24	Welcome North	Rivier	Au
24	Welcome North	QC	Au
24	Welcome North	Mag	Au
25	Welcome North	URCU	Au
26	Silver Hart	Hart Silver (CMC)	Ag, Pb
27	AMP Expl.	Logjam	Au, Ag, Pb, Zn
28	Silverquest/NDU/Adrian	Hyland Gold	Au
29	Canamax	Mount Hundere	Ag, Pb, Zn
30	Chevron	Tim	Ag, Pb, Zn
30	Pak-Man/2001 Resources	Liz, Jef	Ag, Pb
30	Big Creek JV	Nite	Ag, Pb, Au
31	Fairfield/Total Energold	Logan	Ag, Zn
32	Big Creek JV	Gravel	Ag, Pb
33	Curragh	MM	Pb, Zn, Cu
33	Equity Silver	Ram	Pb, Zn
33	Yukon Minerals/Perrex	Groundhog	Ag, Pb, Zn
33	Pacific Comox	Tay-LP	Au
34	Curragh	Sea	Pb, Zn
35	Curragh	Faro NW	Pb, Zn
35	Curragh	Vangorda Plateau	Pb, Zn
36	Cominco	Tom	Pb, Zn, Ag, Ba
37	Cominco	Nidd	Pb
38	NDU Resources	Blende	Zn, Pb, Ag
39	NDU/SMD Mining/Noranda	Marg	Ag, Au, Zn, Pb, Cu
39	International Prism	Kathleen	Ag, Pb, Zn
40	Lodestar	Canalask	Cu
40	Harjay Expl.	Liberty	Au, Cu, Pb
41	Lodestar	Missy	Pt, Cu, Ni
41	Rockridge/Pac-Man	Airways	Pt, Cu, Ni
42	All-North	Wellgreen	Pt, Cu, Ni
42	Rockridge/2001/All-North	Linda	Pt, Cu, Ni
42	Nathan	Glen	Au, Ni, Cu, Pt
43	Polestar	I, IV, V	Pt, Ni, Cu
44	NDU/Pac-Man	Nick	Pt, Ni
a	NDU Resources	Clark	Pb, Zn
b	Prime Expl./Norman/Gigi	Grew Creek	Au
b	W.H. Pinkenburg	WHP	Au
b	Noranda/Golden Nevada	Grew Creek (Canyon)	Au, Ag
b	Prime Expl./Baywest	Ran	Au
b	Noranda/Mintel	Mintel	Au

Table 5 (continued)
Exploration – Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
b	Noranda/Argo	Argo	Au
b	Akito-Lori/Noranda	Hemlo	Au
c	Prime Expl./Halcyon	Ram 5000	Au, Hg
c	A. Carlos	Eldorado	Au, Pb, Cu
c	Welcome North	Hoole	Au
c	Welcome North	Tor	Au
c	Welcome North	ETS	As
c	Welcome North	Star	Au
c	Welcome North	Kepi	Au
d	Berglynn/Skukum Gold	Goddell	Au, Zn
d	Pacific Trans-Ocean	Said	Au, Ag
d	Pacific Trans-Ocean	Glenlivet	Au
d	Academy	Mount Wheaton	Au, Ag
d	Adastral	Aul	Au, Ag
d	Total Energold	Charleston	Au, Ag, Zn
d	Pacific Trans-Ocean	Earl	Au
d	Omni/Skukum Gold	Skukum Creek	Au, Ag
d	Omni/Noranda	Scar	Au
d	Mt. Skukum Gold	Mount Skukum	Au, Ag
d	Total Energold	Mount Anderson	Au, Ag, Pb, Zn
f	Hudson Bay	Whitehorse Copper	Au, Cu

(1) Table Location is made with reference to corresponding numbers on Yukon and Northwest Territories maps. Locations are approximate.

(2) Abbreviated name of the Company is used: Expl. (Exploration), Ltd./Ltée (Limited), JV (Joint Venture).

(3) Geographical areas are indicated by small print, whereas claims and groups are capitalized. Abbreviated words are: Peninsula (Pen), River (R), Lake (L).

(4) Metal(s) of primary importance defined by chemical symbols: copper (Cu), gold (Au), lead (Pb), tantalum (Ta), lithium (Li), asbestos (Asb), molybdenum (Mo), silver (Ag), barium (Ba), cobalt (Co), tin (Sn), iron (Fe), tungsten (W), niobium (Nb), beryllium (Be), rare earth elements (REE), mercury (Hg), antimony (Sb), uranium (U), fluorite (F), gallium (Ga) and germanium (Gr), rhodonite (Rho).

Table 6:
Exploration – Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	Liard River Expl.	Liard River	Placer Au
2	Octan	El Bonanza	Ag
2	Octan	Silver Bear	Ag
3	Neptune	Colomac	Au
3	Golden Rule	ARSENO, NORTH	Au
3	Treasure Island	PEGLEG	Au
4	Aber	CON	Au
4	Asamera	JANELLE	Au
4	Noranda	LEMON, RUSS	Au
4	Prolific	TOM, BAN	Au
4	Hidden Lake	GERM	Au
5	Canamax	TORO	Au
5	Noranda	BELL	Au
5	Chevron/Athabaska	NIC	Au
5	Canamax	NOSE	Au
5	Lawrence	JIM	Au
5	Procan	Cameron River	Au
5	BHP-Utah	LONGSPUR	Au
6	Pacific Trans-Ocean	PTX	Au
6	Durga	Allen Lake	Au
6	Ardic	Thompson-Lundmark	Au
7	Treasure Island	JOON	Au
7	Hidden Lake	RUTH, CHRISTINA	Au
8	Rapparee	Outpost Islands	Au, W
8	Octan	Wilson Island	Au
9	Kelmet/Comaplex	East Arm	Au
9	Fred Loutitt	La Loche River	Au
10	Kelmet	MacInnes Lake	Au
10	Fortune	Salkeld Lake	Au
11	Noranda	CREST	Au
11	W. Kizan	TET, NEY	Au
12	Viscount	Spencer Lake	Au
12	Noranda	Sunset Lake	Au
12	Silver Hart	Sunrise Lake	Au
12	Aber/Hemisphere	Sunrise	Ag, Au, Zn, Pb, Cu
12	Continental Pacific	ZEUS, GLEN, LARK	Au
13	Procan	DANE	Au
13	Noranda/Total Energold	Tundra	Au
13	Bow Valley	KR, TONY	Au
13	Gunnar/Mill City	MOG	Au
13	Pamorex	Salmita	Au
14	Cogema	Courageous Lake	Au
14	Echo Bay	Lac de Gras	Au
15	Gunnar/Mill City	Winter Lake	Au

Table 6 (continued)
Exploration – Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
16	Cominco	REN	Au
16	Pamorex	TREE, TESS, P	Au
17	Cominco/Cogema	AV, CTL, DIGGER	Au
17	Contwoyto	IF, BUCKET	Au
18	Echo Bay	CUB, F	Au
19	BHP-Utah	TAK	Au
20	Expeditior	TEC, HY	Au
20	BHP-Utah	CROWN	Au
21	Orofino/Dore-Norbaska	Arcadia	Au
22	Chevron	FARN, KNUT	Au
22	Chevron	TURNER, TURN	Au
22	Chevron	Hood	Au
23	Expeditior	TEC 1-6	Au
23	Cominco	Camp Lake	Ag, Au
23	Back River JV	BRAU, George Lake	Au
24	Argus	MUSKOX	Au
24	Expeditior	HY	Au
24	Noranda	Thistle Lake	Au
25	Argus	Regan Lake	Au
25	Back River JV	MR	Au
25	Echo Bay	Back River	Au
25	Pamorex	ALGOOD	Au
25	Expeditior	TEC 7-9, Casey Lake	Au
26	Pamorex	JOYCE, TANIA, PATRICIA	Au
26	Pamorex	REX, MOR, PAM	Au
26	Echo Bay	Back River	Au
26	Cody Hawk	ROE, GAS	Au
27	Windflower	NAT	Au
28	Chevron/Galveston	LB	Au
28	Enexo	ENEX	Au
28	BHP-Utah	Tinney Hills	Au
28	Hi Tech/Expeditior/Mingold	Western River	Au
29	Abermin	Hope Bay	Au
29	Abermin	Koignuk River	Au
30	Asamera/Comaplex	Meadowbank	Au
31	Pamorex	SAM	Au
32	Taiga	Baker Lake	Au, Pt, U
33	Taiga	Yathkyed Lake	Au, Pt, U
34	Agnico	Rochon Lake	Au
35	Courageous/Norman	Snowbird Lake	Au
36	Claude	Sandy Beach Lake	Au
37	Noranda	Lothrop Lake	Au
38	Borealis	Padlei Lake	Au
38	Dejour/Nobel Peak	JOYCE	Au
39	Sunmist	Maguse Lake	Au
39	BHP-Utah	Kaminak Lake	Au

Table 6 (continued)
Exploration – Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
40	Placer-Dome	Kaminak Lake	Au
40	Sikaman	Kaminak Lake	Au
40	Borealis	Kaminak Lake	Au
41	Asamera	Carr Lake	Au
41	Asamera	O'Neill Lake	Au
42	Placer-Dome	Kaminak Lake	Au
42	Borealis	Fat Lake	Au
43	Noble Peak	Happy Lake	Au
43	Noble Peak	Quartzite Lake	Au
43	Sikaman	Maze Lake	Au
44	Borealis/Faraway	Pistol Bay	Au
44	Canadian Nickel	IGLOO	Au
45	Comaplex	MacQuoid Lake	Au
45	Comaplex	Christopher Island	Au, U
46	Agnico	Baker Lake	Au
47	Agnico	Daly Bay	Au
48	Asamera/Comaplex	Rankin Inlet	Pt, Ni, Cu
49	Hartz Equities	Wholdaia Lake	Pt
50	Stoney Rapids JV	Thye Lake	Pt
50	Stoney Rapids JV	Opescal Lake	Pt
50	Hartz Equities	Thye Lake (ANKI)	Pt
51	Equinox	CANA	Pt
51	Stoney Rapids JV	Scott Lake	Pt
52	Hartz Equities	Quinn Lake	Pt
53	Aber	Bathurst Inlet	Pt
53	Back River JV	Ellice River	Au
54	Aber	Bathurst Inlet	Pt
55	Equinox/Technigen	Muskox Intrusion	Pt
55	Internat. Platinum	OX	Pt
56	Aber	COREHILL	Pt
57	CEGB Canada	Port Radium	U
58	CEGB Canada	Longtom Lake	U
59	CEGB Canada	Beaverlodge Lake	U
60	Urangesellschaft	Kiggavik	U
60	Urangesellschaft/PNC Expl.	Sessions Lake	U
60	CEGB Canada	Schultz Lake	U
61	PNC Expl.	Schultz Lake	U
62	W. Kizan	PEGGY K	Ba
62	I. Hall	REX	Cu, Au
63	Highwood/Hecla	Thor Lake	Be, REE
a	Nathan	PRO, ANNE	Au
a	Pamorex	PRN, VARGA	Au
a	Golden Marlin	MARLIN	Au
b	Cominco	Little Cornwallis Is.	Pb, Zn

Table 6 (continued)
Exploration – Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
c	Nanisivik	Nanisivik Mine	Pb, Zn
d	Cogema	SEB	Au
d	Echo Bay	Lupin Mine	Au
d	Echo Bay	DER, PEN, CAR	Au
d	Hecla	JOHN, SHIN, DLER	Au
d	Cominco	COCO	Au
d	Bow Valley	BINGO, NOR, TAN, OP	Au

(1) Table Location is made with reference to corresponding numbers on Yukon and Northwest Territories maps. Locations are approximate.

(2) Abbreviated name of the Company is used: Expl. (Exploration), Ltd./Ltée (Limited), JV (Joint Venture).

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**Table 7:
Mineral Production – Yukon Territory
1979-1988**

Mineral	1979	1980	1981	1982	1983	1984	1985	1986	1987(R)	1988(P)	
Gold	\$ kg	13 749 271 1 190	63 029 000 2 982	66 382 000 3 746	39 721 000 2 656	50 337 000 3 006	44 419 000 2 960	42 689 000 3 065	58 237 000 3 547	88 970 000 4 674 000	84 589 000 4 883
Silver	\$ kg	54 218 064 129 982	114 120 000 147 000	32 339 000 80 000	29 943 000 95 000	6 891 000 15 000	18 825 000 54 000	13 098 000 47 000	18 468 000 73 000	40 965 000 133 000	66 322 000 268 000
Lead	\$ kg	103 374 279 78 250 062	71 558 000 65 771 000	54 935 000 55 970 000	25 733 000 35 493 000	307 000 520 000	1 539 000 2 083 000	848 000 1 470 000	23 893 000 35 091 000	105 982 000 100 267 000	152 329 000 152 329 000
Copper	\$ kg	18 422 058 7 778 231	27 082 000 10 433 000	20 123 000 9 094 000	14 654 000 7 510 000	3 977 000 1 904 000		19 000 10 000	13 000 6 000	22 000 9 000	? ?
Zinc	\$ kg	109 460 866 113 572 783	88 313 000 90 938 000	94 237 000 78 806 000	58 519 000 54 537 000	31 000 27 000	244 000 173 000	137 000 109 000	61 521 000 50 634 000	187 336 000 147 045 000	330 927 000 200 927 000
Bismuth	\$ kg						2 000 162	11 000 1 000	5 000 541	2 000 ?	2 000 ?
Cadmium	\$ kg					6 000 2 000	9 000 2 000	5 000 1 000	8 000 2 000	13 000 2 000	458 000 24 000
Sand and Gravel	\$ t				550 000 463 000	1 438 000 480 000	5 105 000 3 074 000	2 995 000 1 185 000	13 355 000 4 902 000	1 502 000 352 000	7 130 000 1 550 000
Sulphur (smelter gas)	\$ t							267 000 2 000	1 000 7	156 000 1 000	970 000 10 000
Coal (E)	\$ t	363 000 23 003	287 000 16 529	368 000 20 860					209 000 17 223	400 000 20 000	200 000 10 000
Stone	\$ t									679 000 206 000	2 800 000 800 000
Rhodonite	\$ kg										212 000
TOTAL	\$	299 244 538	364 389 000	268 016 000	169 120 000	62 987 000	70 143 000	60 069 000	176 310 000	426 027 000	645 939 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.
(P) Preliminary figures, (R) Revised figures, (E) Estimated

Table 8:
Mineral Production – Northwest Territories
1979–1988

Mineral	1979	1980	1981	1982	1983	1984	1985	1986	1987(R)	1988(P)
Gold	\$ 61 868 488 kg 5 356	96 920 000 4 209	85 495 000 4 825	91 415 000 6 113	144 570 000 8 634	191 071 000 12 732	177 079 000 12 713	205 266 000 12 503	223 456 000 11 740	197 906 000 11 422
Silver	\$ 34 770 651 kg 83 358	41 331 000 53 000	13 456 000 33 000	16 073 000 51 000	33 743 000 74 000	20 361 000 59 000	9 083 000 33 000	5 478 000 22 000	4 006 000 13 000	6 785 000 27 000
Copper	\$ 941 732 kg 397 191	679 000 262 000	613 000 277 000	419 000 215 000	214 000 102 000	130 000 69 000	46 000 23 000	1 000 1 000	4 000 2 000	
Lead	\$ 80 117 935 kg 60 645 969	55 853 000 51 337 000	44 680 000 45 522 000	46 367 000 63 955 000	47 901 000 81 161 000	66 647 000 90 198 000	44 489 000 77 083 000	91 129 000 133 836 000	139 370 000 131 744 000	67 227 000 67 227 000
Zinc	\$ 205 600 051 kg 213 323 454	172 556 000 175 685 000	159 764 000 133 604 000	229 110 000 213 523 000	269 951 000 234 883 000	386 813 000 274 920 000	356 415 000 284 223 000	322 064 000 265 073 000	328 781 000 258 070 000	477 630 000 290 000 000
Cadmium	\$ kg				10 000 3 000	1 034 000 214 000	866 000 238 000	670 000 175 000	501 000 86 000	4 124 000 219 000
Bismuth	\$ kg				163 000 32 000	34 000 3 000	60 000 3 000		? ?	
Antimony	\$ kg								141 000 44 000	
Tungsten Trioxide (E)	\$ 52 924 000 kg 3 254 067	67 646 000 4 007 000	43 363 000 2 515 000	38 353 000 2 925 000	11 221 000 1 126 000	33 584 000 3 112 000	38 918 000 3 529 000	17 363 000 2 470 000		
Arsenious Trioxide (E)	\$ t		561 000 1 094	3 862 000 1 780	2 345 000 982	5 837 000 4 684	1 969 000 4 098	254 000 406	666 000 ?	2 168 000 ?
Sulphur (smelter gas)	\$ t					98 000	11 665 000 147 000	21 788 000 59 000	6 912 000 6 000	596 000
Sand and Gravel	\$ t			41 482 000 6 625 000	32 479 000 5 905 000	36 323 000 7 249 000	8 981 000 6 803 000	3 281 000 986 000	8 132 000 2 183 000	7 900 000 2 135 000
Stone	\$ t			1 268 000 323 000	14 601 000 2 409 000	4 617 000 729 000	434 000 163 000	1 011 000 368 000	1 486 000 472 000	1 625 000 500 000
TOTAL	\$ 436 222 857	434 985 000	347 841 000	468 349 000	557 198 000	746 451 000	649 732 000	668 452 000	713 310 000	765 961 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.
(P) Preliminary figures, (R) Revised figures, (E) Estimated



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INTRODUCTION

This report covers the activities of the mines and minerals sector in the Yukon Territory and Northwest Territories during the calendar year 1989.

The report was compiled and written by D.D. Brown and T.W. Caine of Mining and Infrastructure Directorate of the Department of Indian Affairs and Northern Development, Ottawa. Sections on mineral exploration are based on 1989 mining activity overviews produced by DIAND regional geological staff under the direction of S.R. Morison in Yukon and W.A. Padgham in the Northwest Territories. The review of the Yukon placer mining industry is based on a 1989 review produced by the Mining Inspection Division and the Geology Section of DIAND in Yukon. The section on metal prices was written by D. Law-West of the Mineral Economics and Project Analysis Division, DIAND, Ottawa.

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SUMMARY

Yukon Territory

The value of mineral commodities produced in Yukon in 1989 was estimated at \$540.3 million compared with \$492.3 million in 1988. Most of the production value was derived from two hard-rock mines and 220 seasonal placer gold operations. The largest operation, Curragh Resources' Faro zinc-lead-silver mine, was the leading producer followed by the 220 Yukon placer mining operations and Canamax Resource's Ketza River gold mine. The most significant development projects were the early stage development of Curragh Resources' Grum and Vangorda zinc-lead-silver deposits in the Vangorda Plateau area and Curragh Resources' development of the Mt. Hundere zinc-lead-silver property in joint venture with Hillsborough Resources. Mineral exploration expenditures dropped sharply in 1989 to \$18 million from \$50 million a year previously. Exploration activities were directed to the search for both precious and base metals.

Northwest Territories

The value of mineral commodities produced in the Northwest Territories in 1989 was estimated at \$965.6 million compared with \$826.5 million a year earlier. The minerals were produced principally at six hard-rock mines, composed of four gold mines and two zinc-lead mines. The four gold mines are located in Slave Structural Province which extends north from Yellowknife to Coronation Gulf. The two zinc-lead mines are located in the Arctic Islands Region and the northeastern Northwest Territories, well north of the Arctic Circle. Together, zinc and lead production accounted for 80 per cent of the total value of mineral production shipments, while gold production amounted to 18 per cent.

Highlights included rapid progress in the construction of Northgate Exploration's new 9 000 tpd mill on its Colomac gold mine property and the commissioning of Treminco Resource's new 180 tpd mill at its Ptarmigan gold mine. Underground development projects were conducted in the Tundra, MON and Burnt Island gold properties.

Mineral Exploration expenditures dropped sharply to an estimated \$55.6 million in 1989 from \$112.6 million a year previously. Accordingly, there was a reduction in the number of properties explored in 1989 to 121 compared with 157 a year previously. Gold continued to be the leading target commodity accounting for 99 exploration projects, while silver and base metals accounted for 22 projects.

Among the more promising exploration projects were the drilling of the Nicholas Lake, Viking, Goodwin Lake (Kam claims) and Mon gold properties in the Yellowknife volcanic belt. In 1990, Treminco Resources Ltd. plans to mine the Crestaurium gold property.

SOMMAIRE

Yukon

On a estimé la valeur de la production minérale au Yukon en 1989 à 539,9 millions de dollars, comparativement à 492,2 millions en 1988. La majeure partie de celle-ci provenait de deux mines en roche dure et de 220 exploitations saisonnières de placers aurifères. La mine la plus importante, la mine de zinc, plomb et argent de la Curragh Resources à Faro, a connu la production la plus élevée, suivie par les 220 exploitations de placers du Yukon et la mine d'or de la Canamax Resources sur la rivière Ketza. Les projets de développement les plus importants ont été les travaux préliminaires réalisés aux gisements de zinc, plomb et argent Grum et Vangorda de la Curragh Resources, dans la région du plateau Vangorda, et sur la propriété de la société renfermant ces mêmes minéraux, située au mont Hundere, qui a été mise en valeur dans le cadre d'une entreprise en participation avec la Hillsborough Resources. Les dépenses d'exploration minière ont baissé de façon marquée en 1989 pour atteindre 18 millions de dollars, comparativement aux 50 millions que l'on avait connu l'année précédente. Les activités d'exploration ont porté sur la recherche aussi bien de métaux précieux que de métaux communs.

Territoires du Nord-Ouest

On a estimé la valeur de la production minérale dans les Territoires du Nord-Ouest en 1989 à 956,6 millions de dollars, comparativement à 826,5 millions l'année précédente. Les minéraux produits provenaient principalement de six mines en roche dure, soit quatre mines d'or et deux mines de zinc et plomb. Les quatre mines d'or sont situées dans la structure du lac des Esclaves, qui va du nord de Yellowknife au golfe du Couronnement. Les deux mines de plomb et zinc se trouvent dans la région de l'archipel Arctique et dans le nord-est des Territoires du Nord-Ouest, bien au nord du cercle polaire arctique. Dans son ensemble, la production de zinc et de plomb correspondait à 80 p. 100 de la valeur totale des expéditions de minéraux alors que l'or extrait équivalait à 18 p. 100 de la production.

Parmi les faits saillants, citons notamment les progrès rapides réalisés dans les travaux de construction de la nouvelle usine de traitement d'une capacité de 9 000 tonnes par jour de la Northgate Exploration, sur sa propriété aurifère Colomac, et la décision de la Treminco Resources concernant la construction d'une usine de traitement d'une capacité de 180 tonnes par jour à sa mine d'or Ptarmigan. Des projets de

développement souterrain sont aussi été mis en oeuvre sur les propriétés aurifères Tundra et MON, et sur celle de l'île Burnt.

Les dépenses de la prospection des minerais ont baissé de façon marquée en 1989 pour atteindre un montant estimatif de 55,6 millions de dollars, comparativement à 112,6 millions l'année précédente. On a par conséquent constaté au cours de l'année une réduction du nombre de propriétés explorées, qui a atteint 121, comparativement à 157 l'année précédente. L'or a continué de constituer le minéral le plus convoité, faisant l'objet de 99 projets d'exploration, alors que l'argent et les métaux communs étaient visés par 22 projets.

Parmi les projets d'exploration les plus prometteurs, signalons les forages effectués sur les propriétés Viking et MON et sur celles des lacs Nicholas et Goodwin (concessions Kam), dans la zone volcanique de Yellowknife. En 1990, la Treminco Resources Ltd. prévoit exploiter sa propriété aurifère Crestaurium.

MINES AND MINERAL ACTIVITIES

Yukon Territory

Mineral Production

The value of mineral production in Yukon during 1989 was estimated at \$540.3 million compared with \$492.2 million in the previous year. The leading producer, Curragh Resources Inc.'s Faro zinc-lead-silver mine operated at near capacity for most of the year to produce 487 000 t of concentrate. Strong zinc and lead prices have encouraged the company to proceed with the development of the nearby Vangorda Plateau zinc-lead-silver deposits, including the Vangorda, Grum and DY deposits. Canamax Resource's Ketza River gold mine operated at capacity during the year and placer gold production increased approximately nine per cent from the previous year, despite lower gold prices in 1989. Since 1987, placer mining has been second only in value of output to Curragh Resources' zinc-lead-silver production. Other small mine operators produced coal, jade and rhodonite. United Keno Hill Mines Ltd. produced a small quantity of silver and lead before it closed, in January 1989, as a result of low metal prices and high operating costs.

Significant mine development projects included Curragh Resources Inc.'s development work on the Vangorda and Grum deposits and the Curragh Resources-Hillsborough Resources joint venture development work on the Mt. Hundere zinc-lead-silver property.

Yukon's two hard-rock mines, Curragh Resources' Faro Mine and Canamax Resource's Ketza River Mine, employed 639 persons directly in 1989. In addition, Yukon's placer mining industry employed an estimated 700 to 800 persons on a seasonal basis.

Yukon accounted for 12.0 per cent of the zinc and 3.5 per cent of the gold produced in Canada during 1989. Yukon's metallic mineral production amounted to 3.7 per cent of the value of the Canadian total compared with 3.6 percent in 1988.

Mines

Canamax Resources Inc., Ketza River Mine

Average mill throughput at the Ketza River mine(c)* increased to 336 tpd for a total throughput of 119 789 t of ore in 1989. Production amounted to 1 216 kg of gold from ore grading 11.32 g of gold per t. Gold production from oxide ore in the Ketza

River mine's underground workings was augmented by oxide ore from the nearby Break-Nu, Tarn and Ridge open-pits. Over 45 000 t of ore were delivered to the mill in 1989 from these surface deposits.

Known oxide gold reserves are forecast to be depleted in the fourth quarter of 1990. Metallurgical studies of the unmined sulphide reserves indicate that an acceptable gold recovery can be achieved. It is expected that a decision to produce sulphide ore will be made during 1990.

Type:	underground and open-pit
Location:	60 km south of Ross River
Product:	gold
Mill Capacity:	400 tpd
Tonnes Milled:	119 789 t
Oxide Reserves:	124 941 t (December 31,1989)
Oxide Reserve Grade:	12.42 g/t gold
Sulphide Reserve:	180 000 t (December 31, 1989)
Sulphide Reserve Grade:	11.32 g/t gold
Employees:	110 (December 31,1989)

* Numbers or letters in parenthesis indicate the location of the property on the Yukon map.

Table 1:
Mineral Production of Operating Mines in Yukon, 1987, 1988 and 1989

Company, Mine and Commodity	1987		1988		1989(P)	
	t	kg	t	kg	t	kg
Canamax Resources Inc. Ketz River Mine gold		—		635		1 216
Curragh Resources Corp. Faro Mine zinc	184 727		200 927		176 832	
lead	121 539		149 354		108 144	
silver		109 202		214 051		95 428
Nadahini Mining Corporation Whiskey Lake coal	20 000		10 000		40 000	
Total Energold Corporation Mount Skukum Mine gold		1 379		169		—
silver		1 068		N/A		—
United Keno Hill Mines Ltd. Elsa area mines silver		46 437		54 181		902
lead	1 605		2 818		82	
zinc	385		300		N/A	

Source: Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

N/A = Not available — = Nil
(P) = Preliminary

Curragh Resources Inc.

In 1989, the Faro Mine (b) produced 4 391 062 t of ore and recovered 316 000 t of zinc concentrate and 171 000 t of lead concentrate for a total of 487 048 t of concentrate. This compares with 516 310 t in 1988. The output contained 176 832 t of zinc, 108 144 t of lead and 95 428 kg of silver. Production in 1989 was hampered by abnormal weather conditions during the year, as record cold temperatures were followed by rapid and unexpected thaws.

The company expects total capital expenditures to amount to \$141.8 million through to 1992 to develop its ore deposits in the Vangorda Plateau area (b), southeast of the Faro mine. These deposits include the Grum, Vangorda and DY. The company's mine plan contemplates continued ore production from the Faro open-pit through 1991 which, with supplemented ore from a small underground operation in the Faro deposit adjacent to the pit, will provide all the ore feed to the concentrator through mid-1991. By the end of 1992, the existing Faro ore body will be exhausted. In order to maintain the company's existing concentrator through year 2000, the mine plan contemplates that the ore supply will be drawn from the nearby Grum and Vangorda open-pits and the DY underground mine.

In 1989, a portal for a decline to access underground reserves adjacent to the Faro open-pit was established in the pit wall. Pre-stripping of the Grum deposit continued to supply material for the construction of the 14-km long haul road connecting the new pits to the Faro concentrator. Also a mine dry, office complex and water treatment plant were built. In 1990, the first new production will come from the underground mine beneath the southeast corner of the Faro open-pit and from the Vangorda open-pit mine.

Type: open-pit
Location: 13 km north of Faro
Product: zinc, lead, silver
Mill Capacity: 135 00 tpd
Tonnes Milled: 4 391 062 t
Reserves: at Faro and Vangorda Plateau Deposits (December 31, 1989)

	Tonnes (in thousands)	Zinc %	Lead %	Silver (g/t)	Gold (g/t)
Faro open-pit	12 011	4.68	2.75	31	.21
Faro stockpile	1 215	3.26	2.04	27	—
Faro underground	1 178	6.27	4.11	60	.31
Grum open-pit	25 161	5.01	2.96	50	.81
Vangorda open-pit	6 935	4.51	3.49	48	.65
DY underground	11 300	6.84	5.82	83	.94
	57 800	5.23	3.54	52	.66

Employees: 508 (December 31, 1989)

United Keno Hill Mines Limited, Elsa Area Mines

The company only milled 2 177 t of ore at its Elsa mill (a) compared with 91 987 t a year earlier because operations were suspended on January 6, 1989. The Husky Southwest, Bellekeno, Silver King and the open-pits were in production during the first six days of the year. A total of 902 kg of silver and 81.6 t of lead were produced in 1989 although metals sold totalled 5 536.4 kg of silver and 371.9 t of lead. All mining operations were mothballed and the mill and town site facilities were placed on a care and maintenance basis pending improved silver prices.

Type: underground and open-pit
Location: Keno Hill-Galena Hill area, near Elsa
Product: silver, lead
Mill Capacity: 450 tpd
Tonnes Milled: 2 177 t
Reserves: 292 100 t (December 31, 1989)
Reserve Grade: 871 g/t silver, 4.6% lead
Employees: 27 (January 31, 1989)

Seasonal Mine Operations

Anooraq Resources Corp., Evelyn Creek Rhodonite Mine

The company mined approximately 180 t of rhodonite from the Marlin property near Evelyn Creek (e). Some 36 t were shipped to the orient via Vancouver, B.C. Rhodonite is a manganese silicate mineral and is used as a decorative stone.

Nadahini Mining Corporation, Whiskey Lake Mine

The company operated the open-pit Whiskey Lake coal mine (d), located west of Ross River, under an agreement with Curragh Resources Inc. Coal production is trucked to Faro where it is used as fuel for the concentrate drier at the Faro mill. Nadahini mined approximately 40 000 t of bituminous coal in 1989. About one-half of the production was stockpiled for use in 1990. Because of the stockpile, the mine will not be operated during 1990.

Placer Mining

In 1989, Yukon's placer mining industry reported 5 149.8 kg of crude gold, which exceeded the total 1988 production of approximately 5 089.4 kg of crude gold. These production levels surpassed the record set in 1917. The 1989 production represented approximately 4 119.9 kg of fine gold valued at approximately \$59.7 million.

There were approximately 220 active placer operations during the year directly employing an estimated 700 to 800 people during the five- to six-month operating season. The traditional placer mining areas continued to provide over 75 per cent of the gold output. These include the Klondike (2), Sixtymile (1) and Indian River (3) drainages. Placer operations in the Livingston Creek (23), Clear Creek, Burwash (14), Big Creek and Mayo area (9) produced the remaining 25 per cent. In the Dawson Mining District, Teck Mining Corporation produced 260.7 kg of fine gold at its operations on Gold Run Creek, a tributary of Dominion Creek.

Gold City Resources Ltd. continued to mine at three locations on the Indian River (3): at the mouth of Quartz Creek, at the mouth of Ruby Creek and at the mouth of McKinnon Creek. This 20-person operation produced over 167.9 kg of fine gold. The Indian River area, which was basically unmined prior to 1984, is now the leading gold producing area in Yukon. Over

2 489 kg of crude gold has been produced in this area in the period 1985-1989 inclusive.

Other major operators included Queenstake Resources Ltd., which produced 101.1 kg of fine gold from its operation on Maisy Mae Creek (7) and 20.5 kg of fine gold from its operation on Blackhills Creek (6). Canada Tungsten Mining Corporation Ltd. produced 153.4 kg of fine gold from its Swamp Creek (10) operation in the Moosehorn Range. Faith Mines Ltd., at Thistle Creek, 150 km southwest of Dawson City produced approximately 87 kg of raw gold.

In 1989, D-10 Caterpillar bulldozers increased production through their increased ripping capability in the preparation of frozen ground for mining.

Development

One of the most significant projects in 1989 was Curragh Resources Inc.'s development work on the VANGORDA, GRUM and DY (b) stratabound zinc-lead-silver deposits. The initial phase of the new mine developments in the Vangorda Plateau area, 15 km southeast of the Faro mine, consisted of pre-stripping the GRUM deposit. Also, a mine dry, office complex and water treatment plant were constructed. The first new open-pit production in 1990 will come from the 6 000 000 t VANGORDA deposit.

Curragh Resources in joint venture with Hillsborough Resources completed a major drilling project to define open-pit and underground reserves on the Mt. Hunderere zinc-lead-silver property (27). The joint venture partners expect to bring the property into production during 1990. Capital costs of developing the property have been estimated at approximately \$70 million.

Mineral Exploration

Yukon experienced a sharp drop in mineral exploration in 1989 with expenditures falling to \$18 million from a record-high \$50 million in 1988. The decline was due to low prices, for gold and silver, changes to the structure of the flow-through share tax program, high interest rates and the poor performance of equities markets.

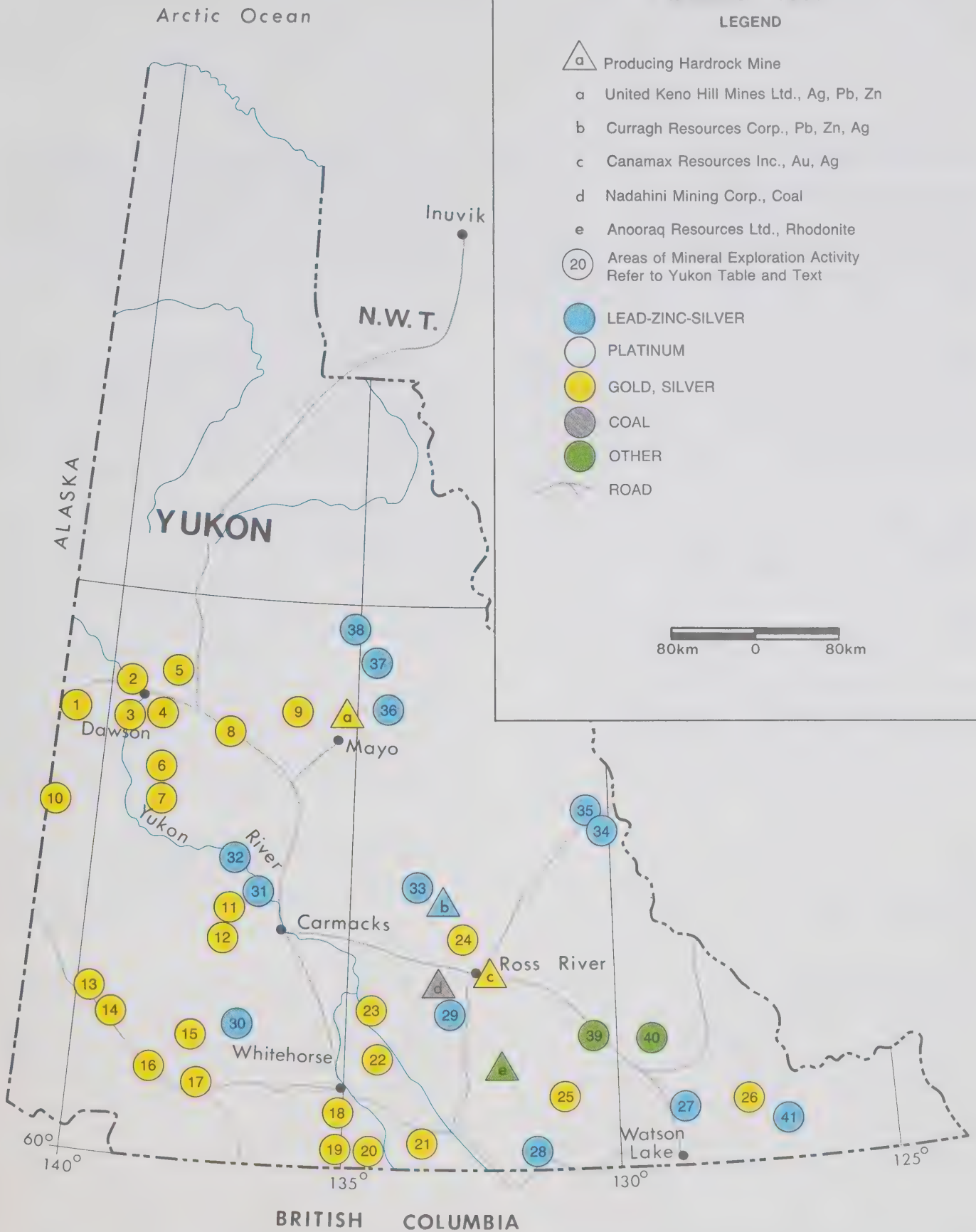
Exploration activities were directed to precious and base metals. Strong base metal prices encouraged exploration for zinc, nickel, copper and lead. Work was done on at least 64 separate properties. Only 15 diamond drill projects were carried out compared with more than 30 the previous year.

YUKON MINERAL EXPLORATION AND MINING - 1989

LEGEND

-  Producing Hardrock Mine
 - a United Keno Hill Mines Ltd., Ag, Pb, Zn
 - b Curragh Resources Corp., Pb, Zn, Ag
 - c Canamax Resources Inc., Au, Ag
 - d Nadahini Mining Corp., Coal
 - e Anooraq Resources Ltd., Rhodonite
-  Areas of Mineral Exploration Activity
Refer to Yukon Table and Text
-  LEAD-ZINC-SILVER
-  PLATINUM
-  GOLD, SILVER
-  COAL
-  OTHER
-  ROAD

80km 0 80km



Exploration Projects

Zinc-Lead-(Precious Metals) Exploration

Near Watson Lake, Curragh Resources Inc., in joint venture with Hillsborough Resources Ltd., purchased the HUNDERE (27) zinc-lead-silver skarn deposit from Canamax Resources Inc. and carried out 29 078 m of infill diamond drilling in 155 diamond holes. The drill program confirmed existing reserves of 5.2 million t grading 13.4 per cent zinc, 5.3 per cent lead and 60 g of silver per t. The reserves include 662 000 t of oxide reserves and 2 360 000 t in the Jewelbox-Hill area. The program confirmed the presence of multiple zones of mineralization in the Jewelbox-Hill area amenable to both open-pit and underground mining.

East of Watson Lake, Barytex Resources Corp. optioned Breakwater Resource's MEL zinc-lead-barite property (41). In 1989, the company conducted engineering studies and drilled 202 m.

First Yukon Silver Resources Inc. discovered high-grade zinc mineralization in two layers of calc-silicate skarn on its property near Swift River (28).

At Macmillan Pass, Cominco Ltd. continued its two-year drill program to test the down-plunge extension of high-grade zones on the west side of the 9 300 000 t TOM (34) zinc-lead-silver deposit. To the northwest of the TOM property, Cominco drilled two holes to check the strike extension of thick low-grade mineralization on the NIDD property (35).

In the Pelly Mountains, Yukon Minerals Corporation reported the discovery of stratiform lead-zinc-silver-copper mineralization over a 400-m strike length adjacent to its GROUNDHOG property (29).

Some 32 km northeast of Keno City, Archer, Cathro and Associates (1981) Ltd. completed five diamond drill holes on the MARG (36) volcanogenic massive sulphide deposit for NDU Resources Ltd. Zinc-lead-copper-silver-gold mineralization occurs in two sub-parallel zones over a strike length of 280 m. Geological reserves amount to 3 480 000 t grading 1.76 per cent copper, 2.68 per cent lead, 5.01 per cent zinc, 59.7 g of silver per t and 1.06 g of gold per t. The JANE occurrence, a similar target located 7.5 km to the southeast of the MARG deposit, was explored with soil and geophysical surveys.

On the BLENDE property (37), northeast of Mayo, Billiton Metals Canada Inc. optioned the claims from

NDU Resources Inc. Epigenetic lead and zinc occur in brecciated Proterozoic dolomite. Archer, Cathro and Associates (1981) Ltd. carried out a program of detailed mapping and geochemistry in 1989 as a follow-up to a three-hole drill program that was conducted in 1988. Intermittent mineralization was traced on surface over a strike length of 6 km.

Copper Exploration

At Aishihik Lake, Casau Resources Ltd. and Aurora Gold Ltd. drilled on the HOPKINS gold skarn property (30), formerly owned by Whitehorse Copper Mines Ltd. Up to five skarn horizons were successfully traced and drilling on the south side of Franklin Creek intersected 7.8 m grading almost 2 per cent copper.

In the Dawson Range, two copper deposits hosted in foliated granodiorite were re-evaluated. At the WILLIAMS CREEK deposit (31), with an oxide reserve of 14.5 million t grading one per cent copper, Teck Corporation shipped a three t bulk sample for metallurgical leach testing and began baseline environmental studies. United Keno Hill Mines Ltd. carried out 4 897 m of rotary drilling to test geochemical targets near the MINTO (32) copper deposit. The deposit contains 6.55 million t at an average grade of 1.86 per cent copper. A new showing was discovered northeast of the MINTO deposit, with mineralization grading 0.93 per cent copper over a strike length of 39.6 m. A rotary drill hole on the showing intersected 4.5 m grading 0.22 per cent copper.

In the Faro area, Aurum Geological Consultants Inc. drilled two holes for Eagle Lake Resources Ltd. on the RESERVE property (33) to test a gravity anomaly associated with a copper-bearing skarn. Massive pyrite and pyrrhotite were encountered during the 1989 drilling.

Near Haines Junction, Harjay Exploration Ltd. investigated a copper occurrence previously drilled by Canadian Barranca Mines Ltd. on the ELLEN property (17). Massive chalcopyrite (copper-iron sulphide) occurs in three black shale layers. A chip sample across the mineralization assayed 8.55 per cent copper.

Nickel Exploration

All-North Resources Ltd. released a pre-feasibility study on its WELLGREEN nickel-copper-platinum property (13) in the Kluane Range. Drill-indicated, probable and possible geological reserves are approximately 42.3 million t grading 0.36 per cent nickel,

0.35 per cent copper, 0.51 g of platinum per t and 0.34 g of palladium per t. The pre-feasibility study indicated that 70 per cent of the deposit can be mined using low-cost open-pit methods with a low stripping ratio. Metallurgical tests indicated that 80 to 85 per cent of the nickel, 95 per cent of the copper and 70 per cent of the platinum and palladium can be recovered using conventional mill flotation technology.

Northeast of Mayo, Archer, Cathro and Associates (1981) Ltd. explored for sediment-hosted nickel for Inco Ltd. In 1987, unusual shale-hosted nickel mineralization was first discovered on the NICK property (38) and the search has extended for similar deposits.

Gold Exploration

In the Watson Lake area, Archer, Cathro and Associates (1981) Ltd. carried out rotary drilling on the HYLAND GOLD property (26) to confirm geological reserves previously estimated at 6.75 million t of oxide material grading 1.99 g of gold per t to a depth of 60 m. The property was being explored for the Hyland Gold Joint Venture comprising Silverquest Resources, NDU Resources Inc. and Adrian Resources.

In the Dawson area, Total Energold Corporation explored the O'BRIEN (5) property, where several swarms of arsenopyrite-rich veins containing gold occur along faults at the margin of the Antimony Mountain syenite intrusion. Diamond drill holes intersected several gold-bearing lenses.

Also in the Dawson area, Noranda Exploration Co. Ltd. explored several properties in the Ogilvie Mountains. On the BREWERY CREEK property (5), soil geochemistry, geophysics, trenching and diamond drilling were conducted.

United Keno Hill Mines Ltd. explored for gold mineralization in vein-faults with 89 rotary drill holes totalling 4 461 m and 15 diamond drill holes totalling 1 488 m on the QUARTZ CREEK (4) and GOLD BOTTOM CREEK (4) properties. No anomalous assays were returned.

On the SLEET property (8), at Clear Creek, J.C. Stephens Explorations Ltd. drilled an induced polarization (IP) anomaly for Secret Pass Minerals Corp. The best of four holes intersected 0.49 m which assayed 18.7 g of gold per t.

In the Mt. Freegold area, Doron Exploration Inc. completed six diamond drill holes near the CARIBOU

CREEK (11) discovery. The holes returned values of up to 42.1 g of gold per t over 4.6 m.

At Big Creek, near Mt. Freegold, Archer, Cathro and Associates (1981) Ltd. drilled six holes to test the porphyry copper-gold potential beneath the 4 300 000 t NUCLEUS (11) low-grade oxide gold deposit. One drill hole intersected 38 m grading 0.87 g of gold per t and 0.52 per cent copper.

B.Y.G. Natural Resources Inc. released a feasibility study on the MT. NANSEN (12) gold deposit in 1989. Total reserves of almost 1 000 000 t are estimated in several zones. Four of the zones contain 575 979 t of proven and possible reserves grading 11.8 g of gold per t and 197 g of silver per t. The company was seeking financing to refurbish its 270 t per day mill and bring the property into production.

On the adjoining GOULTER property (12), owned by Aurchem Exploration Ltd., silver-lead bearing veins were identified in the main WILLOW CREEK zone.

Southwest of Mt. Nansen, Noranda Exploration Co. Ltd. explored the DOWS property (12), owned by prospector Eugene Curley. The 1989 work included magnetometer, IP surveys and one diamond drill hole.

An old showing near the head of Granite Creek was restaked by Eugene Curley as the GRIZZLY claims (11). Bulldozer trenching exposed a 6-m wide quartz-arsenopyrite vein, which yielded chip samples of 7.2 g of gold per t over 3.5 m.

South of Klaza River, Archer, Cathro and Associates (1981) Ltd. explored three new veins on the TAWA property (12), owned by B.Y.G. Natural Resources Inc. The best chip sample assayed 5.2 g of gold per t and 31.5 g of silver per t across 2.5 m.

In 1989, Omni Resources Inc. and Skukum Gold Inc. completed a preliminary mine evaluation of the SKUKUM CREEK (19) gold-silver deposit, located southwest of Whitehorse. The deposit contains geological reserves of 800 150 t grading 7.6 g of gold per t and 275 g of silver per t. The fully diluted mineable reserves amount to 465 393 t of approximately the same grades. The joint venture companies planned to put the property into production in 1989, but a general slump in equities markets during the year and the problem of acquiring a nearby mill delayed the project.

Also in the Wheaton River area, Mount Skukum Gold Mining Corporation conducted geological mapping, geochemistry and geophysical surveys south and west of the Mount Skukum Mine (19). Thirteen diamond drill holes tested the continuity of the previously-identified OCEAN, GOAT and TANGO veins. Four new areas were also identified including the anomalous WATUSI vein.

Immediately to the south of the Mt. Skukum property, Aurum Geological Consultants Inc. explored the EARL property (19) for Northern Minerals Ltd. and the adjoining CHARLESTON property (19) for Total Energold Corporation. Work in 1989 included trenching and geophysical surveys on both properties and mapping the old adits on the CHARLESTON property. One section of the CHARLESTON vein yielded 4.8 g of gold per t and 59.4 g of silver per t over a width of 0.48 m and length of 12.5 m.

Adastral Resources Ltd. reported that chip samples taken across the STEVE vein on its MACAULEY CREEK property (19) assayed 3 120 g of silver per t and 6.0 g of gold per t across 1.8 m.

Following an extensive geochemical sampling program, United Keno Hill Mines Ltd. drilled two anomalies on the JOE PETTY property (20) on Montana Mountain, where gold and silver occur in a brecciated quartz vein cutting altered volcanic rocks.

Northeast of Whitehorse, geological mapping was carried out on Larry Carlyle's MT. BYNG property (22), where gold and copper occur in vuggy, brecciated quartz carbonate veins.

Near Squanga Lake, south of Whitehorse, Dunvegan Exploration Ltd. explored a gold-bearing quartz-sulphide vein on the TOG property (21).

At Reed Creek (13) in the Kluane Range, Reed Creek Placers explored a large quartz-carbonate-graphite zone believed to be associated with placer gold nuggets found in the canyon.

Nathan Minerals Ltd. conducted a drilling program on the GLEN property (14) in the Burwash uplands.

Near Haines Junction, Harjay Exploration Ltd. obtained a gold assay from a sample of quartz vein material on the COLTON claims (17).

In the Ruby Range, United Keno Hill Mines Ltd. conducted soil samples and mapped three claim blocks on the RUBY property (15).

In the Rancheria area, Oropex Minerals Inc. trenched and sampled on the MATTHEW property (25).

In the Tintina Trench, Goldnev Resources Inc. completed a 10-hole, 1 164 m diamond drill program on the Main Zone deposit of the GREW CREEK property (b). Geological reserves have been estimated at 773 012 t grading 8.91 g of gold per t and 33.6 g of silver per t. Within this reserve, a high grade reserve of 184 948 t grading 12.14 g of gold per t has been identified.

Silver Exploration

High grade silver-lead-zinc veins occur on the MURNION silver property (24) near FARO. Bulldozer trenching in 1989 uncovered two narrow veins.

On the KINCORA property (16) at the head of Silver Creek, prospector Ron Stack blasted and trenched a stockwork of veins that yielded high assay values of silver, copper and zinc.

In the Wheaton River area, Graham Davidson obtained high-grade assay values of silver, lead and copper from a 1.5 m channel sample taken on the EVIEW property (18).

Jade Exploration

Jim Dodge mapped three nephrite serpentine bodies and packed about 300 kg of good quality jade from his LEE property (39) in the Campbell Range.

Max Rosequest mined about 70 t of jade on the KING property (40) near Watson Lake.

MINES AND MINERAL ACTIVITIES

Northwest Territories

Mineral Production

In 1989, mineral production was derived principally from six hard rock mines, composed of four gold mines and two zinc-lead mines. Production estimates for the mines are listed in Table 3. Although mine production at the Pine Point Mine ceased in 1987 and mill production in 1988, concentrates continued to be shipped from the Pine Point concentrator stockpile during the year.

The value of mineral production in the N.W.T. was estimated at \$965.6 million in 1989 compared with \$826.5 million a year earlier. Gold and silver prices were lower in 1989 compared with 1988, but both zinc and lead prices remained strong. Together, zinc and lead production accounted for 80 per cent of the total value of mineral production shipments while gold production accounted for 18 per cent.

Highlights of the N.W.T. mining scene included rapid progress on the construction of Northgate Exploration's 9000 t per day mill on its Colomac gold mine property and the commissioning of Treminco Resource's new 180 t per day mill at its Ptarmigan gold mine. Advanced exploration highlights included completion of the shaft and underground development at the Tundra property owned by Noranda Exploration Co. Ltd., Hemlo Gold Mines Inc. and Total Energold Corporation. Underground drilling was completed in October 1989 and the project was suspended. Can-Mac Exploration Ltd. drove a decline on the MON gold property and Cameron Mining Ltd. extended a decline at Burnt Island.

The mineral industry in the N.W.T. accounted for 25.6 per cent of the zinc, 13.6 per cent of the lead, 7.6 per cent of the gold and 1.6 per cent of the silver produced in Canada during 1989. The value of these metals combined with by-product bismuth and cadmium accounted for 6.6 per cent of Canada's metallic mineral production in 1989 compared with 5.9 per cent in 1988.

The six operating mines in the N.W.T. directly employed 1 692 persons during 1989 compared with 1 848 persons at seven operating mines in 1988.

Mines

Canada Tungsten Mining Corporation's tungsten mine at Cantung, N.W.T. remained on a care-and-maintenance basis throughout 1989. Depending on

the market for tungsten, production could be resumed within a four-month period. The proven and probable reserves at the Cantung mine are 1 400 000 t grading 1.20 per cent tungsten trioxide (WO_3).

Cominco Ltd. and Pine Point Mines Limited, Polaris Mine

The Polaris zinc-lead mine (b)* on Little Cornwallis Island, is the western world's most northerly base metal mine. The Polaris Mine joint venture operation of Cominco Ltd. (55 per cent) and Pine Point Mines Ltd. (45 per cent) set annual production records in 1989 for both tonnage milled and zinc concentrate produced. The Polaris mill processed 1 023 300 t of ore for an output of 224 500 t of zinc concentrate and 41 000 t of lead concentrate. The increased concentrate production were primarily attributable to higher ore grades of 14.1 percent zinc and 3.5 per cent lead compared with 13.8 per cent zinc and 3.7 per cent lead a year previously. Contained metal produced in 1989 was approximately 139 190 t of zinc and 32 062 t of lead. Ten shipments of concentrate by bulk carriers were made to Europe between August 1 and October 25, 1989, for a record total of 267 400 wet t. During the year, the installation of a \$4.4 million crushing and conveying system was completed to provide for the transport of ore from the bottom of the ore body to the concentrator.

Type:	underground
Location:	Little Cornwallis Island (120 km northwest of Resolute)
Mill Capacity:	2 100 — 3 100 tpd
Tonnes Milled:	1 023 000 t
Reserves:	13.095 million t (December 31, 1989)
Reserve Grade:	14.3 per cent zinc, 3.8 per cent lead
Employees:	267 (December 31, 1989)

Echo Bay Mines Ltd., Lupin Mine

The Lupin gold mine (d) is located 90 km south of the Arctic Circle and approximately 400 km northeast of Yellowknife. In 1989, the Lupin mill processed 1 717 t of ore per day with an average grade of 10.32 g of gold per t. This compares with 1 687 t of ore per day

* Numbers or letters in parenthesis indicate the location of the property on the map of the Northwest Territories in the centrefold.



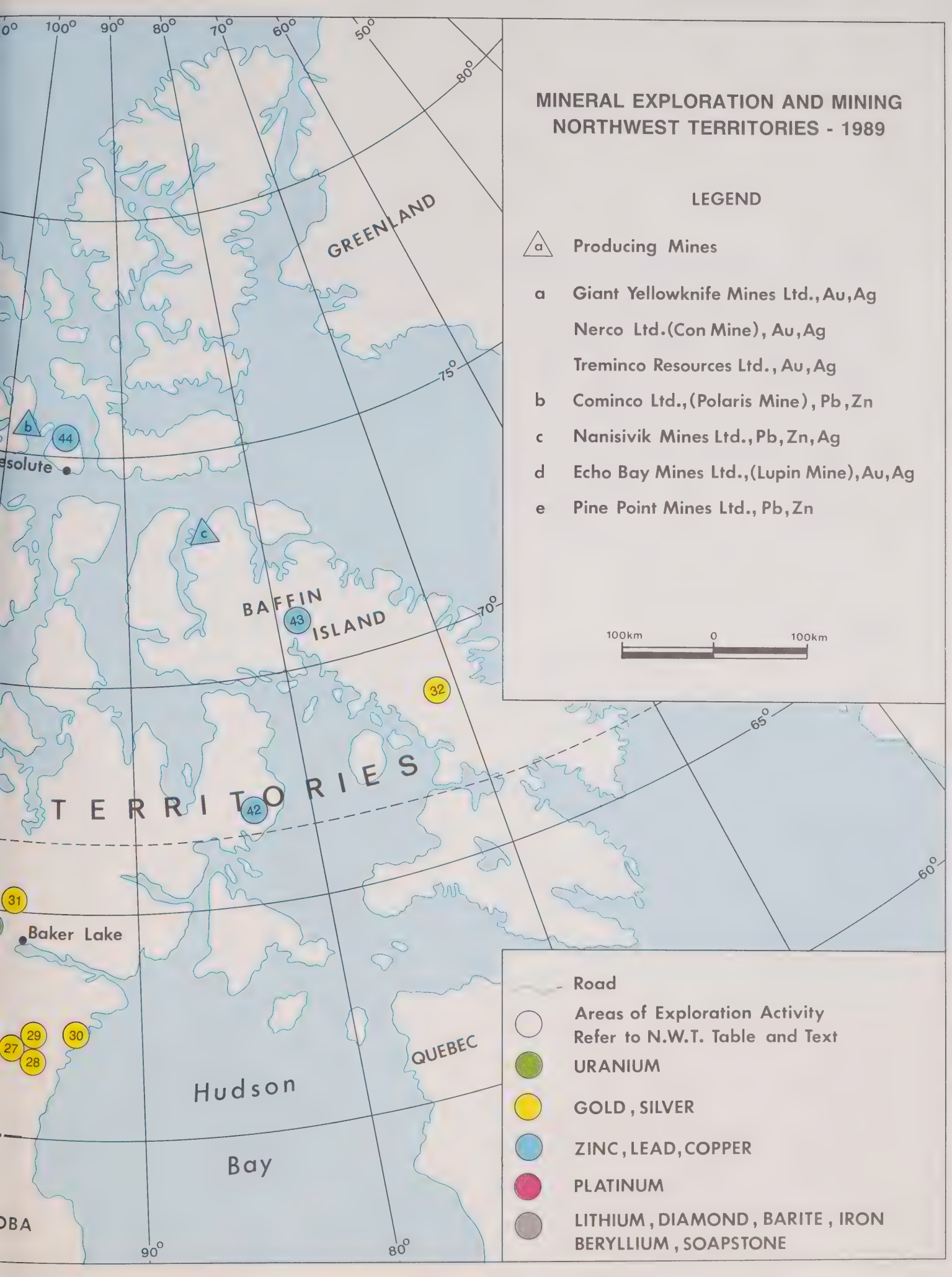


Table 2:
Mineral Production of Operating Mines in the Northwest Territories, 1987, 1988 and 1989

Company, Mine and Commodity	1987		1988		1989(P)	
	t	kg	t	kg	t	kg
Cominco Ltd.						
Polaris Mine						
zinc	128 800		134 800		139 190	
lead	26 500		34 200		32 060	
Echo Bay Mines Ltd.						
Lupin Mine						
gold		6 006		6 297		6 082
silver		882		N/A		N/A
Giant Yellowknife Mines Ltd.						
Giant Mine						
gold		2 380		2 224		3 270
Nanisivik Mines Ltd.						
Nanisivik Mine						
zinc	57 900		63 100		57 328	
lead	2 500		1 000		2 448	
silver		23 000		22 200		16 956
Nerco Con Mine Ltd.						
Con Mine						
gold		2 576		2 551		2 992
silver		622		510		621
Treminco Resources Ltd.						
Ptarmigan Mine						
gold		102		416		478
silver		10		N/A		N/A

Source: Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

N/A = Not available — = Nil

(P) = Preliminary

and 10.59 g of gold per t a year earlier. The mine shaft deepening program continued. At year end, the shaft was deepened to the 3 120 foot depth (951 m) and deepening will extend to the 4 000 foot depth (1 219 m) in 1990.

Type:	underground
Location:	400 km northeast of Yellowknife
Product:	gold
Mill Capacity:	1 600 — 2 000 tpd
Tonnes Milled:	1 717 tpd
Reserves:	41 834 kg of gold
Reserve Grade:	10.62 g/t gold
Employees:	408 (December 31, 1989)

Giant Yellowknife Mines Ltd., Giant Mine

In 1989, the mill at the Giant gold mine (a) processed 357 409 t of ore at an average grade of 7.53 g of gold per t for an output of 2 583.9 kg of gold. This compares with 322 490 t of ore averaging 6.56 g of gold per t in 1988. The tailings retreatment operation contributed 686.5 kg, so that gold production from both conventional and tailings retreatment amounted to 3 270.4 kg in 1989 compared with 2 223.6 kg in 1988. The increased output in 1989 resulted from increased tonnage to both facilities and a higher grade from conventional production.

Tailings retreatment, originally designed for 9 070 t per day, was limited by frozen conditions at depth within the in situ tailings. Throughput in 1989 was 992 644 t of tailings grading 2.08 g of gold per t and recovery of 28.6 per cent. The retreatment plant operated from mid-May to the beginning of October.

Type:	underground and open pits
Location:	2.4 km north of Yellowknife
Product:	gold
Tonnes Milled:	357 409 t
Reserves:	2.896 million t (December 31, 1989)
Reserve Grade:	8.62 g/t gold
Tailings Re-treatment Plant Capacity:	9 070 tpd
Tonnes Processed:	922 644 t
Reserves:	5.09 million t (December 31, 1989)
Reserve Grade:	2.18 g/t gold
Employees:	400 (December 31, 1989)

Nanisivik Mines Ltd., Nanisivik Mine

Production at the Nanisivik Mine (c) in 1989 amounted to 706 000 t of ore grading 8.4 per cent zinc compared with 675 900 t grading 9.7 per cent in 1988. Approximately one half of the ore came from the main ore body and the remainder from satellite deposits. Zinc concentrate production in 1989 declined to 103 500 t from 113 100 t in 1988, reflecting the effect of a planned reduction in mining grade. Concentrate shipments in 1989 amounted to 96 400 t of zinc and 4 200 t of lead compared with 127 700 t of zinc and 1 300 t of lead in 1988. The lower tonnage delivered in 1989 was a result of no carry over of inventory, lower concentrate production and the last concentrate shipment scheduled in November was not made due to ice conditions at Nanisivik.

Type:	underground
Location:	27 km east of Arctic Bay, Baffin Island
Product:	zinc, lead, silver
Mill Capacity:	2 000 tpd
Tonnes Milled:	706 000 t
Reserves:	2.98 million t (December 31, 1989)
Reserve Grade:	8.5 per cent zinc, 0.39 per cent lead, 41 g/t silver
Employees:	198 (December 31, 1989)

Nerco Con Mine Ltd., Con Mine

The Nerco Con Mine (a) produced 2 992 kg of gold and 621 kg of silver from 243 620 t of ore milled in 1989. In 1988, the company produced 2 551 kg of gold and 510 kg of silver. The production increase coupled with a dramatic reduction in production costs resulted from projects started in 1987 to modernize and renovate the operation, control costs and improve productivity. A new headframe and renovated shaft completed in 1989 at the Con Mine will increase the mine's ore-hoisting capacity by 20 per cent and permit access to new mine areas.

Type:	underground
Location:	1.4 km south of Yellowknife
Product:	gold, silver
Mill Capacity:	650 tpd
Tonnes Milled:	243 620 t
Reserves:	2.26 million t (December 31, 1987)
Reserve Grade:	10.42 g/t gold
Employees:	374 (December 31, 1989)

Pine Point Mines Limited, Pine Point Mine

Milling at the Pine Point zinc-lead mine (e) was discontinued during the summer of 1987. In 1989, rail car loading of concentrate, that was stockpiled at the Pine Point concentrator for delivery to smelters, continued. Zinc concentrate sales were 233 900 t and lead concentrate sales were 3 100 t. Inventories at year-end 1989 were 101 900 t of zinc concentrate and 18 200 t of lead concentrate. Zinc concentrate sales are expected to be completed by the third quarter of 1990, and lead concentrate sales are expected to continue into 1991 before the stockpile is depleted. Reclamation activities continued through 1989 at the Pine Point operation and town site.

Tremanco Resources Ltd., Ptarmigan Mine

The headframe at the company's Ptarmigan Mine (a) was completed in January and the hoist was installed in May 1989. The shaft was operational to the 450-foot (137 m) level and was being rehabilitated from the 450-foot to the 600-foot (183 m) level. Production during calendar year 1989 amounted to 478.5 kg of gold compared with 416.5 kg of gold a year earlier. The company started up its new 180 tpd concentrator at the mine site in June 1989. In the first half of 1989, all ore was sold to Giant Yellowknife Mines Ltd. for custom milling at the Giant concentrator. In the 12 months ended July 31, 1989, mill production amounted to 40 324 t with an average grade of 14.2 g of gold per t. Although no production came from the company's Tom gold mine, 1.6 km from the Ptarmigan Mine, part of the company's reserves are contained in an ore block in the Tom Mine containing approximately 4 500 t grading 7.78 g of gold per t.

Type:	underground
Location:	20 km east of Yellowknife
Product:	gold
Mill Capacity:	180 tpd
Tonnes Milled:	40 324 (July 31, 1988 to July 31, 1989)
Reserves:	106 140 t (July 31, 1989)
Reserve Grade:	10.58 g/t gold
Employees:	45

Development

The Tundra underground exploration development program, which began in July 1988 was completed in December 1989. The Tundra property is owned by

Noranda Exploration Co. Ltd., Hemlo Gold Mines Inc. and Total Energold Corporation. A 476-m, two-compartment vertical shaft was sunk and 767.4 m of drill drifts, 359.7 m of cross-cuts, 629.2 m of ore drifts and six raises totalling 131.3 m were driven. Some 125 underground diamond drill holes (26 664.9 m) and 36 bazooka holes (582.2 m) were drilled and a 1 283 t bulk sample was prepared. Results from this work, coupled with extensive metallurgical test work and a pre-feasibility study, indicated that the Tundra gold deposit (14), although containing a large inventory of gold, is too low grade and discontinuous to be economic at current (1989) prices. The potential remains for high-grade reserves on the large claim group.

Northgate Exploration Ltd's affiliate ABM Gold Corp., at years-end 1989, had completed 90 per cent of the construction at its Colomac gold mine project (11), located 219 km north-northwest of Yellowknife. Capital cost of the project was later reported at \$166 million. Initial production from the 9 020 tpd mine and mill is scheduled for the second quarter of 1990. The plant is designed to produce 6 200 kg of gold annually. Open-pit reserves for the deposit were announced in January 1989 as 25 million t grading 1.9 of gold per t. The Colomac project is supplied by a winter ice road for three months of the year and by aircraft on a year-round basis. During the year, Neptune Resources Corp. was amalgamated with Northgate's 50 per cent-owned ABM Gold Corp.

Mineral Exploration

Mineral exploration expenditures in the N.W.T. were estimated at approximately \$55.5 million in 1989 compared with \$112.6 million in 1988. The decline was ascribed to changes in flow-through financing, a decline in the price of gold, a general weakness in North American stock markets and a freeze in claim staking in the area north of Great Slave Lake as part of the Dene-Metis land claim settlement. In 1988, claim staking declined from 1 098 claims to 500 claims, but Slave Structural Province, lying north of Great Slave Lake was the most active staking and exploration region. There was a reduction in the number of properties explored in 1989 to 121 compared with 157 in 1988. The number of properties drilled declined to 48 in 1989 compared with 69 in 1988. Gold continued to be the leading target commodity, accounting for 99 exploration projects. Silver and base metals accounted for 22 projects. Last year only seven base metal properties were explored.

Among the promising exploration projects were the drilling of the Nicholas Lake, Viking, Goodwin Lake (Kam claims) and Mon gold properties in the Clan Lake — Discovery area of the Yellowknife volcanic belt. A decline was driven on the Mon property. Also, at the south end of this area, Treminco Resources Ltd. plans to mine the Crestaurium gold property in 1990.

Exploration Projects

Southern Slave Structural Province, Indin Lake Area: Gold Exploration

Northgate Exploration Ltd.'s affiliate ABM Gold Corp. continued construction of the Colomac Mine (11), 212 km north-northwest of Yellowknife. Production is scheduled to begin in the second quarter of 1990. The company continued exploration of its mine properties with approximately 5 000 m of drilling and ground geophysics. During this year, ABM Gold Corp. acquired majority control of the Neptune Resources Corporation.

At Mesa Lake, Noranda Exploration Co. Ltd. completed VLF-EM, IP and ground magnetometer surveys and soil sampling on the MESA1-5 claims (11).

Etruscan Enterprises Ltd. conducted magnetometer and VLF-EM surveys on the AZTEC, KING, GOLDEN PRINCE, SOUTH, INDIN and LEX claims (11).

On the INDIN claims (12), near Indin Lake, Noranda Exploration Co. Ltd. conducted EM and ground magnetometer surveys. At Norris Lake on the NOR 1-5 claims (12), the company completed magnetometer and EM surveys and approximately 500 m of drilling.

Russell Lake Area: Gold Exploration

Echo Bay Mines Ltd. drilled 1 500 m on the SP claims (18), under option from Aber Resources Ltd.

Covello-Bryan and Associates Ltd. geologically mapped the RUST, ISL, CHANCE, TIP and APEX claims (18) for Pacific Northwest Resources Inc.

Fortune Minerals completed an airborne geophysical survey over the YELLER claims (18) and conducted follow-up ground geophysics.

In the Wheeler Lake area, Hidden Lake Gold Mines Ltd. completed reconnaissance geological mapping of the GERM claims (19). Three iron formations along an

11-km strike length were gridded and mapped. One 3-m chip sample averaged nine g of gold per t.

Courageous Lake Volcanic Belt: Gold Exploration

A joint venture among Noranda Exploration Co. Ltd. (25.5 per cent), Hemlo Gold Mines Inc. (25.5 per cent) and Total Energold Corp. (49 per cent) continued its major underground exploration project on the Tundra gold deposit (14). The exploration work included completion of the 476-m vertical shaft, 1 890 m of underground development on the 425 m level, the mining of three bulk samples and over 27 000 m of underground diamond drilling. The joint venture concluded that while the Tundra deposit represents a large gold inventory, the grade of ore encountered would not permit a production decision in 1990. Surface exploration work on the TUNDRA property consisted of ground-magnetometer, VLF-EM and IP surveys as well as approximately 200 m of drilling.

Battle Mountain Gold Company conducted reconnaissance mapping, sampling and ground geophysics on the MOG claims (14).

Yellowknife Greenstone Belt: Gold Exploration

Golden Marlin Resources Ltd. drilled on the HOPE claims (a), in Yellowknife Bay, to test shear zones delineated by seismic and IP surveys.

Nerco Con Mines Ltd. continued to explore its mining leases by underground and surface drilling of the Negus Shear Zone and NEGUS property (a).

Giant Yellowknife Mines Ltd. completed 92 short holes totalling 4 000 m to explore for open-pit reserves on its GIANT property (a).

Nathan Minerals conducted VLF-EM and magnetometer surveys on its ANN and PRO claims (a).

Kelmet Resources Ltd. continued exploration on the Walsh Lake property (a) by prospecting and drilling.

On the MON property (a), at the north end of Discovery Lake, Can-Mac Exploration Ltd. drilled 1 000 m to test auriferous quartz veins. The drill program was followed by development of a decline and raise totalling 100 m, to obtain a 3 000 t bulk sample.

Dave Webb prospected and mapped the NEL 1 claim (a).

At Sito Lake (a), Noranda Exploration Co. Ltd. carried out an IP survey, soil sampling and 700 m of diamond drilling. On the CUR claims, near Sito Lake, the company also conducted an IP survey and drilled approximately 450 m.

Yellowknife Basin Area: Gold Exploration

Teminco Resources Ltd. conducted a drilling program on its mining lease to explore the southwestern and northeastern extensions of the Ptarmigan (a) vein and to drill other parallel veins located between the Ptarmigan and Tom veins. Treminco reported ore-grade intersections on the No. 2 vein and conducted exploration drifting on the TOM vein.

Kelmet Resources Ltd. conducted VLF-EM and magnetometer surveys on the CJ 2 and JAK 1 claims and prospected the CADEN 1 claim (a).

Hecla Canada Ltd. re-sampled the gold and base metal potential of the KA 1-3 and PAN 1-2 claims (a).

Aber Resources Ltd. and Continental Pacific Resources Ltd. completed mapping, an IP survey and trenching on the VAD and VAD 1-3 claims (a), at Goodwin Lake.

Kamsal Mining Corp. drilled the KAM 1-5 claims (a) west of Goodwin Lake.

Canamax Resources Inc. mapped and drilled the VIKING property (a), south of the old Discovery mine.

Athabaska Gold Resources Ltd., the operator, and Chevron Minerals Ltd. continued exploration on their Nicholas Lake property (a), 90 km north of Yellowknife. Geological mapping, ground and airborne magnetometer and EM surveys, an IP survey, trenching and drilling of 42 holes, totalling 4 072 m were completed. Drill-indicated reserves were reported as 557 000 t grading 12.16 g of gold per t. Together with inferred reserves, the reserve totals 1 114 000 t grading 12.2 g of gold per t.

At Burnt Island, Gordon Lake area, Cameron Mining Ltd. conducted an underground exploration program on New Era Developments Ltd.'s property (16). The program included driving a decline to the 30 m level, drifting and raising on the No. 1 vein to obtain a 2 500 bulk sample.

Mt. Grant Mines Ltd. conducted preliminary mapping and sampling on the Bullmoose Lake gold mine property (17).

Hidden Lake Gold Mines mapped and trenched on its leases and claims in the Ruth Mine area (17).

Cameron River and Beaulieu River Volcanic Belts: Gold and Base Metals Exploration

North of Fenton Lake, Freeport-McMoran Gold Company drilled nineholes totalling approximately 1 200 m, on the LONGSPUR claims (16), to test a gold showing.

On the Allan Lake property (16), optioned from Durga Resources Limited, Noranda Exploration Co. Ltd. conducted geochemical and geological mapping, Max-Min EM and magnetometer surveys.

Pamorex Minerals Inc. prospected the AP and RED claims (16).

Aber Resources Ltd. completed geological mapping and geophysical surveys on its polymetallic massive sulphide projects in the Victory Lake area (37). The company plans to drill the EMILY claim in 1990.

In the Turnback-Tumpline Lakes area, Strathcona Mineral Services Ltd. optioned claims from Aber Resources Ltd. and Kelmet Resources Ltd. that cover base metal showings (37). Strathcona conducted geological mapping, geochemistry, magnetometer, Max-Min EM and VLF-EM surveys, all as a follow-up to an airborne geophysical survey.

Hidden Lake Gold Mines Ltd. prospected the JE claims (37) south of Tumpline Lake.

Noranda Exploration Co. Ltd. conducted detailed geological mapping and drilled one hole on the SUNSET SOUTH claims (37). Noranda also mapped and sampled in the Sunset Lake area and drilled other base metal targets, including 1 100 m on the SHEET claims (37), optioned from Kelmet Resources Ltd., 250 m on the SUN claims, optioned from All Gold Mines Ltd. and 450 m on its FEDED property. Noranda also drilled 800 m and completed a gravity survey on its SUNSET NORTH property. At the Sunrise deposit (37), Noranda drilled 12 holes totalling 3 600 m and completed magnetometer, EM and gravity surveys.

Continental Pacific Resources Inc. found two new showings of zinc-copper mineralization on its LARK property (37). The company completed geological mapping, IP, Max-Min, EM and VLF-EM surveys. Drilling of the LARK deposit was planned to resume in early 1990.

Cominco Ltd. mapped and sampled the RUBY claims (15).

Camsell Lake Area: Gold Exploration

Hidden Lake Gold Mines completed a prospecting project on the NANCY, CAM, CINDY and CANOE claims (15).

Indian Mountain Lake Area: Base Metals Exploration

At Indian Mountain Lake, 172 km east-northeast of Yellowknife, Ego Resources Limited and Asquith Resources Inc. completed 3 636 m of drilling on the BB Lake deposit (38), a volcanogenic massive sulphide deposit discovered in 1948. The drilling confirmed both known grades and widths of the deposit. Ego Resources planned to resume drilling in 1990 to test the depth potential of the BB Lake zone which has a 1969 reserve estimate to a depth of 198 m of 880 000 t grading 9.5 per cent zinc, 0.7 per cent lead and 116.6 g of silver per t.

The company will also test the depth potential of the Kennedy Lake zone, 500 m to the west of the BB Lake zone. The former zone has a 1969 reserve estimate to a depth of 76 m of 635 000 t grading 6 per cent zinc, 1 per cent lead and 171.4 g of silver per t.

Northern Slave Structural Province: Gold and Base Metals Exploration

The Back River Joint Venture composed of Homestake Mining Company and Kerr McGee Corporation conducted an airborne geophysical survey over Prospecting Permits 1168, 1169 at Nose Lake (8), the SAW 1-4 claims at Saw Lake (8) and the MR 1 and BRAU 61-69 claims in the Malley Rapids — Needle Lake area (9). The anomalies defined were followed up by ground geophysics and prospecting.

BHP-Utah Mines Ltd. drilled and conducted geological mapping, magnetometer, VLF-EM and IP surveys on the CROWN claim and the adjoining DEN claims (6). The claims were optioned from Aber Resources Ltd.

BPH-Utah Mines also conducted the same types of geophysical surveys on the ULU claims (6), west of the CROWN claims. On the ARNICA claims and Prospecting Permit 1181 in the Anialik River (5) belt, the company's program comprised mapping, prospecting, magnetometer and VLF surveys. West of Bathurst Inlet, the company prospected parts of Prospecting Permit 1118 (3).

BHP-Utah Mines mapped and prospected in the High Lake Volcanic Belt on the BRAVO and CAIRO claims and staked the CYGNET claim (5). On the Hood River, the company mapped and prospected Permit 1146 (6). The company also conducted some short hole drilling on the BRAD claims (d), northeast of Contwoyto Lake.

Bre-X Minerals Ltd. prospected anomalies outlined by a 1988 Questor airborne geophysical survey. The company mapped and prospected the ED claims at Migration Lake and the RED claims (8), 30 km to the east. Orientation magnetometer and VLF-EM surveys were completed at two locations.

Chevron Minerals Ltd. trenched and sampled the TURNER and TURN claims (3) at Turner Lake. Four drill holes were completed to check previously-drilled, high-grade core intersections. Chevron also completed a structural study of the FARN and KNUT claims (3) at Pistol Lake.

Cominco Ltd. conducted rock sampling and both magnetometer and HL-EM surveys on the PRO claim (d).

The Cominco Ltd.-Cogema Ltd. Joint Venture explored the COCO claims (d) northeast of Contwoyto Lake by drilling, geological mapping, HL-EM and magnetometer surveys. The JON claim (d) was also explored by drilling.

Cominco Ltd. in a joint venture with Westview Resources Ltd. mapped, sampled and drilled the REN claims (7). In 1988, possible geological reserves outlined by drilling amounted to 1.09 million t grading 6.52 g of gold per t. One hole drilled in 1989 expanded the possible reserves.

Continental Pacific Resources Ltd. explored its properties in the High Lake and Anialik River belts, including the HIL and CHARLY claims (5), the CHAR, MIST and TAM claims (4), and the ALF and CHARLIE claims (5). Prospecting, sampling and geological mapping were conducted on all of these claim blocks and, in selected areas, magnetometer, VLF-EM and HL-EM surveys were conducted.

Contwoyto Goldfields Ltd. conducted a soil and rock geochemical survey on the IF claims (d).

Echo Bay Mines Ltd. drilled in the Leanne Lake area (7) and on the Lupin Mine lease (d).

Falconbridge Nickel Ltd. explored the HOOD claims (36) by a lithogeochemical survey.

The George Lake Joint Venture, composed of Homestake Mining Company Ltd. and Kerr McGee Corporation tested iron formation by drilling at three locations in the George Lake area (10). Magnetometer and VLF-EM surveys were conducted at five locations in the George Lake area and 25 km to the southeast, in the Boot Lake area (10).

Hecla Mining Company of Canada Ltd. explored the JOHN, SHIN, DLER, CAMP and ADD claims (d) at Contwoyto Lake by geological mapping, soil sampling and IP surveys.

Orofino Resources Ltd. drilled on the ARCADIA property (4), on Coronation Gulf.

Sirius Energy Corporation explored the Esker Lake, MUSKOX claims (8). Work included trenching, magnetometer and VLF-EM surveys and drilling, all as a follow-up to a Questor airborne geophysical survey conducted in 1988. At the FIRE claims (9), in the Regan Lake-Fiddler Lake area, the company resampled anomalous areas outlined by a Questor airborne geophysical survey, also conducted in 1988.

Bear Structural Province and East Arm of Great Slave Lake: Gold, Platinum and Beryllium Exploration

CEGB Exploration (Canada) Ltd. flew an EM survey over the BUD (48), BULLY and BULLWINKLE claims (49). Anomalies were followed up by ground geophysics, trenching and sampling on the BUD property, where the target was gold. On the BULLY and BULLWINKLE claims, the target was Port Radium-type silver, uranium, copper, cobalt and nickel deposits.

International Platinum Corporation drilled on the OX claims (53), on the Muskox intrusive complex. The target was platinum-group metals.

In the eastern arm of Great Slave Lake, Leeward Capital Corp. explored gold projects on the REX claims (22) at Meridian Lake.

Kelmet Resources explored claims at Lac Duhamel near Snowdrift (21).

MPH Consulting Ltd. conducted geophysical surveys of BBX Resources Ltd.'s claims near Taltheilei Narrows (20).

A decision on development of the Thor Lake (17) beryllium-rare earth project of Highwood Resources Ltd. and Hecla Mining Co. was suspended pending a marketing study.

District of Keewatin and Part of Southeastern District of Mackenzie

Snowbird Lake-Ennadai Lake Volcanic Belt; Gold, Base Metals and Uranium Exploration

Taiga Consultants Ltd. conducted exploration for gold on claims and prospecting permits near Snowbird Lake (25) and Atzinging Lake (24). The work was conducted on behalf of Courageous Exploration Ltd. on properties optioned from Comaplex Resources International Ltd. and Leeward Capital Corp.

W.A. Hubackek Consultants Ltd. conducted regional exploration work in the Rochon Lake-Kasba Lake area (25) for Agnico Eagle Mines Ltd.

Athabaska Gold Resources Ltd. sampled boulders on the ESK and ENN claims near the N.W.T.-Saskatchewan border (24) for precious and base metals.

District of Keewatin

BHP-Utah Mines Ltd. continued exploration for gold in the Kaminak Lake area (28) on two prospecting permits and on claims staked in 1988. Work included till geochemistry, prospecting, mapping, sampling, Max-Min EM and VLF-EM surveys and airborne magnetic and DIGHEM surveys.

Comaplex Resources International Ltd. explored the Woodburn Group (31) northwest of Tehek Lake for gold. Exploration included magnetometer, VLF-EM and Max-Min EM surveys together with a 1 500 m diamond drill program.

Dejour Mines Ltd., operator of the Turquetil Lake Project, in joint venture with Noble Peak Resources Ltd. explored the Turquetil Lake properties (27). An IP

survey was conducted over the main showing where previous exploration had outlined gold mineralization.

Inco Gold Ltd. returned to its IGLOO claims near Wilson Bay (30). Exploration work included mapping, sampling, IP surveys and a 1 610 m diamond drill project.

Noble Peak Resources Ltd. concentrated on the Southwin Venture property at Quartzite Lake (29). The Mac and Cache zones were the main exploration targets with 500 m of drilling on the Mac zone. On the Cache zone, probable reserves are 236 000 t grading 9.60 g of gold per t and possible reserves are 127 600 t grading 8.9 g of gold per t.

Noranda Exploration Company Ltd. explored the DEB, DEM and JEN claims (26) near Otter Lake by prospecting, mapping, trenching and sampling.

Sikaman Gold Resources Ltd. continued operations at Kaminak Lake (29) and Maze Lake (30). Exploration work on the KAM, MAZE and NORSIK claims included magnetometer surveys, mapping and sampling.

A positive feasibility study was announced for the Kiggavik uranium mine project of the joint venture partners Urangesellschaft Canada Ltd. and CEGB Exploration (Canada) Ltd. (45). Development of the open-pit mine, south of Schultz Lake, was being reviewed by a Federal Environment Assessment Review Office public hearing process in 1989.

Joint venture partners Urangesellschaft, CEGB Exploration (Canada) Ltd. and PNC Exploration (Canada) Ltd. explored the North Sissons property (45), north-west of Judge Sissons Lake. Exploration of the three prospecting permits included mapping, DIGHEM IV, resistivity, gravity and radiometric surveys and over 5 900 m of drilling.

PNC Exploration (Canada) Ltd. in joint venture with BP Resources Ltd. explored the L claims (45) south of Schultz Lake, with EM, magnetometer and gravity surveys. Over 1 000 m was drilled.

PNC and CEGB Exploration (Canada) Ltd. jointly conducted exploration on the west Schultz project (47), including mapping and sampling.

Talston Magmatic Zone

In the Talston magmatic zone, east of Great Slave Lake, prospector James Price conducted a radiometric survey of the REO claim (50).

At Rutledge Lake (39), BHP-Utah Mines Ltd. sampled and mapped nickel-copper-platinum group element prospects, optioned from Enesco International Ltd.

Nonacho Basin

In the Nonacho Basin, Fortune Minerals Ltd. explored gold-silver-copper-lead-zinc deposits on the FD claims at Salkeld Lake (40).

Solid Resources Ltd. optioned, sampled and mapped the Thye Lake nickel-copper deposit (41).

Arctic Islands Region: Base Metals Exploration

In the central Arctic, Cominco Ltd. drilled a zinc-lead deposit on Truro Island (b) and continued its ore delineation drilling at the Polaris Mine (b), on Little Cornwallis Island.

Nanisivik Mines Ltd. continued to explore for new ore deposits on the Nanisivik Mine property (c), Borden Peninsula, Baffin Island. The company also explored a 15 000 sq. km area of north central Baffin Island from a base camp at Mary River (43).

Borealis Exploration Ltd. explored prospecting permits near Nagvaak (Naquak) Lake (42), southeastern Melville Peninsula, for base metals.

Cordillera Region: Gold and Other Exploration

Sirius Resources Corp. and Verdstone Gold Corp. explored the SELINA CREEK property (34) for placer gold. Encouraging results from test pits resulted in the staking of a large claim block in the Caribou River area. A summer survey was completed along Selena Creek and test pitting was conducted to estimate the volume of potential gold-bearing gravel.

Liard River Exploration and Mining Co. tested gravel bars for placer gold on its claims on the Liard River (33).

Procan Exploration Co. Ltd. geologically mapped and geochemically sampled the AX, DOG and MITERK claims (35).

M.R. Vulimiri completed geological mapping, soil sampling and a VLF-EM survey on the CHUCK-1 claims (34).

Metal Prices

The focus of this section of the report is to provide some information about the prices and the markets for the metals and minerals produced in the Northwest and Yukon territories. Lead, zinc and silver are produced and exported in concentrate form. Gold, including most placer gold, is exported as dore bars or crude placer gold for further refining outside of the territories.

The metal concentrates produced in the territories are sold and shipped to metal smelters mainly in Europe and Asia as well as the United States. These concentrates are normally sold to smelters under long-term contracts, the conditions of which are negotiated annually. While each concentrate sales contract is different, all contracts contain similar conditions with regard to: when, where and how much concentrate will be delivered; what smelter charges will be levied or how much of the metal contained in the concentrate will be payable; what penalties for undesirable metals or credits for minor metals will be levied; which metal price will be used for payment; and what the timing of payment will be.

At the time of contract negotiations, the smelter charges are agreed upon along with an escalation/reduction formula. This formula allows for changes in metal prices when the contract is signed and when the concentrates are actually delivered. Smelters pay for the concentrates based on the average metal price usually for the month following delivery.

Most conditions of the sales contracts are confidential between the buyer and the seller, due to the highly competitive nature of the mining and metals industry. The metal price that will be used for final payment calculation is the one condition of the contract based on public information. Often the average of a quoted metal price from the London Metal Exchange (LME), the Commodities Exchange (COMEX), or the North American Producers' price depending on the point of sale and the metals involved in the contract. These prices are published in the major mining industry trade journals.

The London Metal Exchange in London, England, is the most important metal commodity exchange. Its quoted metal prices are most often used as a reference price in sales contracts.

The LME was established in the late 1800s at a time when commodity markets were developing into true terminal markets where trading could be done on both a spot basis and a future delivery basis. Since its inception, the LME has evolved into a broad-based metals market. After beginning to trade in copper and tin, other metals have been added including aluminium, lead, nickel, silver and zinc.

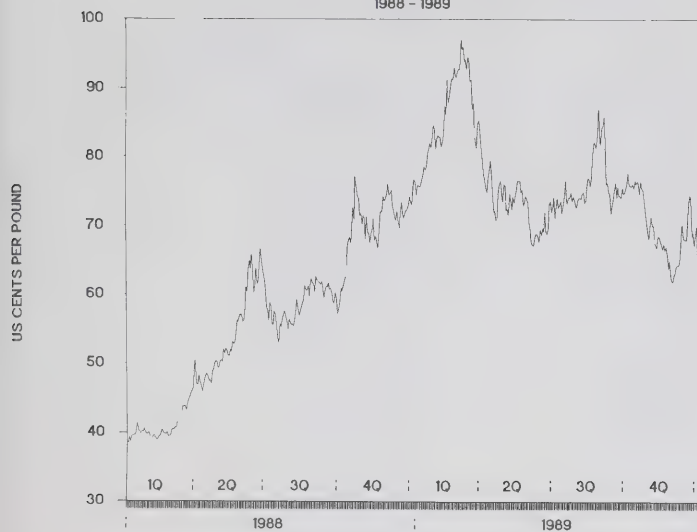
As with many institutions that have been around a long time, the LME has undergone fundamental changes to the internal workings while on surface much remains relatively unchanged. Membership is still limited to 36. Trading for each metal is by open outcry and is limited to two, five-minute sessions each morning and afternoon. The daily official reported price is the last best bid and offer for each metal of the morning session as determined by the LME Quotation Committee. The accompanying graphs show the daily LME official price fluctuations for lead, zinc and silver in 1988-89.

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2. *The London Metal Exchange A commodity market*, 3rd Edition 1989, R. Gibson-Jarvie; Woodhead-Faulkner; London England.
3. *Wolff's Guide to the London Metal Exchange*; Rudolf Wolff & Co. Limited, 2nd Edition, 1980; Metal Bulletin Books Ltd. London, England.

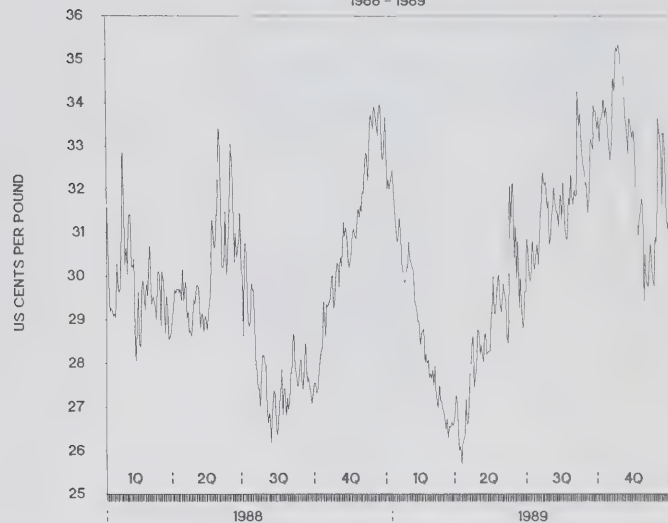
LONDON METAL EXCHANGE ZINC PRICES

1988 - 1989



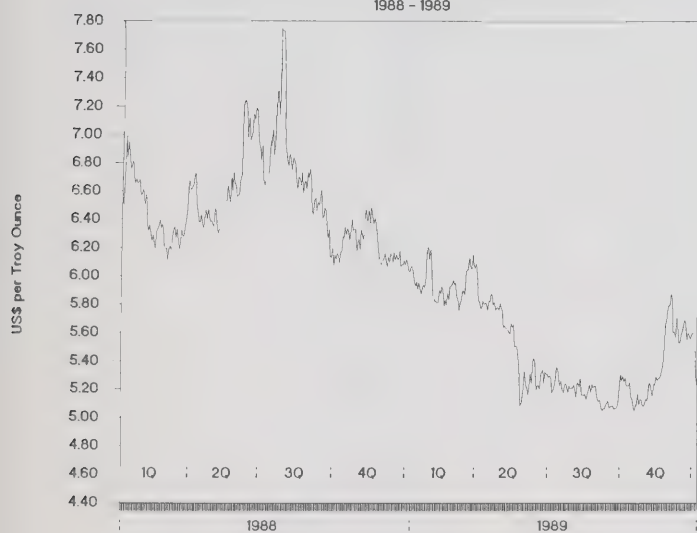
LONDON METAL EXCHANGE LEAD PRICES

1988 - 1989



LONDON BULLION MARKET SILVER PRICES

1988 - 1989



LONDON BULLION MARKET GOLD PRICES

1988 - 1989

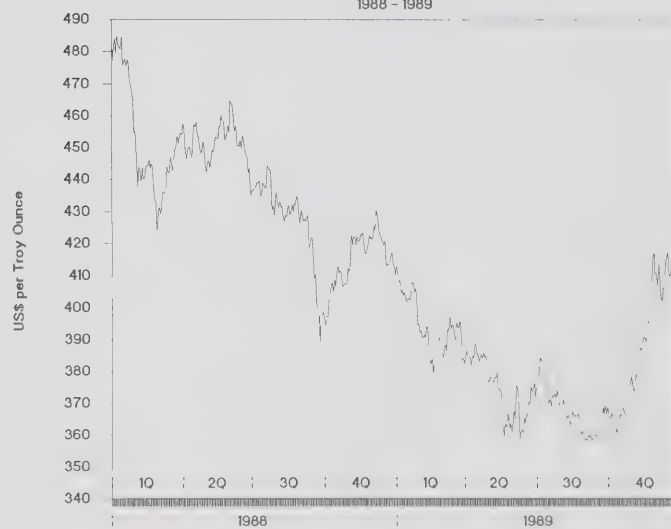


Figure 1 Metal Prices

Table 3:
Exploration, Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1		Sixtymile	Placer Au
2		Klondike	Placer Au
3	Gold City	Indian River	Placer Au
4	United Keno Hill	Gold Bottom Creek	Au
4	United Keno Hill	Quartz Creek	Au
5	Total Energold	O'BRIEN	Au
5	Noranda	BREWERY CREEK	Au
6	Teck	Gold Run Creek	Placer Au
6	Queenstake	Blackhills Creek	Placer Au
7	Queenstake	Maisy May Creek	Placer Au
8	Secret Pass	SLEET	Au
9		Mayo	PlacerAu
10	Canada Tungsten	Swamp Creek	Placer Au
11	Archer, Cathro	NUCLEUS	Au, Cu
11	Doron	Caribou Creek	Au
11	E. Curley	GRIZZLY	Au
12	BYG Natural	Mount Nansen	Au, Ag
12	BYG Natural	TAWA	Au, Ag
12	Aurchem	GOULTER	Au, Ag, Pb
12	Noranda	DOWS	Au
13	Reed Creek Placers	Reed Creek	Au
13	All-North	WELLGREEN	Pt, Cu, Ni
14	Nathan	GLEN	Au
14	Burwash	Placer	Au
15	United Keno Hill	RUBY	Au
16	R. Stack	KINCORA	Ag, Cu, Zn
17	Harjay	ELLEN	Cu, Au
17	Harjay	COLTON	Au
18	G. Davidson	EVIEW	Ag, Pb, Cu
18	G. Davidson	PUGH PEAK	Au, F
19	Mount Skukum Gold	Mount Skukum	Au, Ag
19	Omni/Skukum Gold	Skukum Creek	Au, Ag
19	Total Energold	CHARLESTON	Au, Ag
19	Northern Minerals	EARL	Au
19	Adastral	Macauley Creek	Ag, Au, Pb, Zn
20	United Keno Hill	JOE PETTY	Au, Ag
20	United Keno Hill	Venus Mine	Au, Ag
21	Dunvegan	TOG	Au, Pb, Zn, Cu
22	L. Carlyle	Mount Byng	Au, Cu
23		Livingston Creek	Placer Au
24		MURNION	Ag, Pb, Zn
25	Oropex	MATTHEW	Au
26	Silverquest/NDU/Adrian	PORKER (HYLAND GOLD)	Au
27	Curragh/Hillsborough	HUNDERE	Zn, Pb, Ag
28		BAR	Zn, Pb, Ag
28	First Yukon	Swift River	Zn
29	Yukon Minerals	GROUNDHOG	Pb, Zn, Ag, Cu

Table 3 (continued)
Exploration, Yukon Territory

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
30	Casau	HOPKINS	Cu
31	Teck	Williams Creek	Cu
32	United Keno Hill	Minto	Cu
33	Eagle Lake	RESERVE	Cu
34	Cominco	TOM	Zn, Pb, Ag
35	Cominco	NIDD	Zn, Pb, Ag
36	NDU Resources	MARG, JANE	Cu, Pb, Zn, Ag
37	Billiton	LENDE	Pb, Zn, Ag
38	Inco	NICK	Ni
39	J. Dodge	LADY LEE	Jade
40	M. Rosequist	KING ARCTIC	Jade
41	Barytex	MEL	Zn, Pb, Ba
b	Curragh	Vangorda Plateau	Pb, Zn, Ag
b	Curragh	DY	Pb, Zn, Ag
b	Goldnev	GREW CREEK	Au, Ag
c	Canamax	GULLY, TARN, KNOLL	Au

(1) Table location is made with reference to corresponding numbers on Yukon and Northwest Territories maps. Locations are approximate.

(2) Abbreviated name of the Company is used: Expl. (Exploration), Ltd./Ltée (Limited), JV (Joint Venture).

(3) Geographical areas are indicated by small print, whereas claims and groups are capitalized. Abbreviated words are: Peninsula (Pen), River (R), Lake (L).

(4) Metal(s) of primary importance defined by chemical symbols: copper (Cu), gold (Au), lead (Pb), tantalum (Ta), lithium (Li), asbestos (asb), molybdenum (Mo), silver (Ag), barium (Ba), cobalt (Co), tin (Sn), iron (Fe), tungsten (W), niobium (Nb), beryllium (Be), rare earth elements (REE), mercury (Hg), antimony (Sb), uranium (U), fluorite (F), gallium (Ga) and germanium (Gr), rhodonite (Rho).

Table 4:
Exploration, Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
1	L. Anderson	Elu Inlet	Au
2	L. Anderson	Hiukitak River	Au
3	BHP-Utah	Bathurst Inlet	Au
3	Chevron	TURNER, FARN, KNUT	Au
4	Orofino	ARCADIA	Au
4	Continental Pacific	CHAR, MIST, TAM	Au
5	BHP-Utah	Anialik River	Au
5	BHP-Utah	BRAVO, CAIRO, CYGNET	Au
5	Continental Pacific	HIL, CHARLY, ALF, CHARLIE	Au
6	BHP-Utah	Hood River	Au
6	BHP-Utah	DEN, CROWN, PULSE	Au
6	BHP-Utah	ULU	Au
7	Cominco/Westview	REN	Au
7	Echo Bay	Leanne Lake	Au
8	Back River JV	Nose Lake	Au
8	Bre-X Minerals	ED, RED	Au
8	Sirius	MUSKOX	Au
8	Back River JV	SAW	Au
9	Sirius	FIRE	Au
9	Back River JV	MR, BRAU	Au
10	George Lake JV	George Lake	Au
10	George Lake JV	Boot Lake	Au
11	Noranda	MESA	Au
11	Neptune	COLOMAC	Au
11	Etruscan	AZTEC, KING, INCA	Au
12	Noranda	INDIN	Au
12	Noranda	NOR	
13	S.A. Eccott	Exeter Lake	Au
14	Noranda/Total Energold/Hemlo	TUNDRA	Au
14	Battle Mountain	MOG	Au
15	Hidden Lake	NANCY, CAM, CINDY	Au
15	Cominco	RUBY	Au
16	Freeport-McMoran	LONGSPUR	Au
16	Noranda	Allan Lake	Au
16	Pamorex	AP, RED	Au
16	Cameron	Burnt Island	Au
17	Highwood/Hecla	Thor Lake	Be, REE
17	Mt. Grant Mines	Bullmoose Lake	Au
17	Hidden Lake	RUTH	Au
18	Echo Bay	SP	Au
18	Pacific Northwest	RUST, ISL, TIP, APEX	Au
18	Fortune Minerals	YELLER	Au
19	Hidden Lake	GERM	Au
20	BBX Resources	Taltheilei Narrows	Au
21	Kelmet	Lac Duhamel	Au
22	Leeward Capital	Meridian Lake	Au
23	B. Weir	MING	Au, U
24	Athabaska	ESK, ENN	Au, Pb, Zn
24	Courageous Exploration	Atzinging Lake	Au

Table 4 (continued)
Exploration, Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
25	Courageous Exploration	Snowbird Lake	Au
25	Agnico Eagle	Rochon Lake	Au
26	Noranda	DEB, DEM, JEN	Au
27	Dejour/Noble Peak	Turquetil Lake	Au
28	BHP-Utah	Kaminak Lake	Au
29	Sikaman	Kaminak Lake	Au
29	Noble Peak	Quartzite Lake	Au
30	Sikaman	Maze Lake	Au
30	Inco Gold	IGLOO	Au
31	Comaplex	Tehek Lake	Au
32	Comaplex	THOM	Au
33	Liard River Expl.	Liard River	Placer Au
34	Sirius/Verdstone	Selena Creek	Placer Au
34	M.R. Vulimiri	CHUCK	Au
35	Procan	AX, DOG, MITERK	Pb, Zn, Ag
36	Falconbridge	HOOD	Zn, Cu, Ag
37	Aber	Victory Lake	Zn, Pb, Ag, Au
37	Strathcona	Tumpline Lake	Zn, Pb, Ag, Au
37	Hidden Lake	JE	Zn, Pb, Ag
37	Noranda	Sunset South	Zn, Pb, Ag, Au
37	Noranda	SHEET	Zn, Pb, Ag, Au
37	Noranda	Sunrise	Zn, Pb, Ag, Au
37	Continental Pacific	LARK	Zn, Cu
38	Ego/Asquith	BB Lake	Zn, Pb, Ag
39	BHP-Utah	Rutledge Lake	Ni, Cu, Pt
40	Fortune	Salkeld Lake	Cu, Pb, Zn, Au
41	Solid Resources	Thye Lake	Ni, Cu
42	Borealis	Nagvaak Lake	Pb, Zn
43	Nanisivik	Mary River	Pb, Zn
44	Cominco	Cornwallis Island	Pb, Zn
45	Urangesellschaft	Kiggavik	U
45	PNC Expl./BP Resources	Schultz Lake	U
46	Urangesellschaft	Judge Sissons Lake	U
46	CEGB Exploration	BIFF	U
47	PNC Expl./CEGB Expl.	West Schultz	U
48	CEGB Exploration	BUD	Au
49	CEGB Exploration	BULLY, BULLWINKLE	U, Ag, Cu
50	J. Price	REO	U
50	C. Williams	O'Connor Lake	Pb, Zn
51	Corona	North Arm, Great Slave L.	Diamonds
52	BP Minerals	Horn Plateau	Diamonds
53	International Platinum	OX	Pt
a	Nerco Con	NEGUS	Au
a	Golden Marlin	HOPE, MARLIN	Au
a	Giant Yellowknife	GIANT MINE	Au
a	Treminco	CRESTAURUM	Au
a	Hecla	KA, PAN	Au
a	Nathan Minerals	ANN, PRO	Au
a	Can-Mac	MON	Au

Table 4 (continued)
Exploration, Northwest Territories

Location (1)	Company (2)	Property/Area (3)	Mineralization (4)
a	Kamsal	KAM	Au
a	Athabaska/Chevron	Nicholas Lake	Au
a	Kelmet	Walsh Lake	Au
a	D. Webb	NEL	Au
a	Noranda	Sito Lake	Au
a	Kelmet	CJ, JAK, CADEN	Au
a	Aber/Continental Pacific	VAD	Au
a	Canamax	VIKING	Au
b	Cominco	Truro Island	Pb, Zn
d	BHP-Utah	BRAD	Au
d	Contwoyto Goldfields	IF	Au
d	Cominco	PRO	Au
d	Cominco/Cogema	COCO, JON	Au
d	Hecla	JOHN, SHIN, DLER	Au

- (1) Table location is made with reference to corresponding numbers on Yukon and Northwest Territories maps. Locations are approximate.
- (2) Abbreviated name of the Company is used: Expl. (Exploration), Ltd./Ltée (Limited), JV (Joint Venture).
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**Table 5:
Mineral Production — Yukon Territory
1980–1989**

Mineral	1980	1981	1982	1983	1984	1985	1986	1987	1988(R)	1989(P)
Gold	\$ 63 029 090 kg 2 982	66 382 000 3 746	39 721 000 2 656	50 337 000 3 006	44 419 000 2 960	42 669 000 3 065	58 237 000 3 547	88 970 000 4 674	87 386 000 5 052	80 504 000 5 551
Silver	\$ 114 120 000 kg 147 000	32 339 000 80 000	29 943 000 95 000	6 891 000 15 000	18 825 000 54 000	13 098 000 47 000	18 468 000 73 000	40 965 000 133 000	42 593 000 159 000	13 384 000 64 000
Lead	\$ 71 558 000 kg 65 771 000	54 935 000 55 970 000	25 733 000 35 493 000	307 000 520 000	1 539 000 2 083 000	848 000 1 470 000	23 893 000 35 091 000	105 982 000 100 267 000	118 696 000 117 058 000	X X
Copper	\$ 27 082 000 kg 10 433 000	20 123 000 9 094 000	14 654 000 7 510 000	3 977 000 1 904 000		19 000 10 000	13 000 6 000	22 000 9 000	X X	X X
Zinc	\$ 88 313 000 kg 90 938 000	94 237 000 78 806 000	58 519 000 54 537 000	31 000 27 000	244 000 173 000	137 000 109 000	61 521 000 50 634 000	187 336 000 147 045 000	237 932 000 143 939 000	341 649 000 158 024 000
Antimony	\$ kg								X X	35 000 14 000
Bismuth	\$ kg				2 000 162	11 000 1 000	5 000 541	2 000	2 000	3 000
Cadmium	\$ kg			6 000 2 000	9 000 2 000	5 000 1 000	8 000 2 000	13 000 2 000	62 000 3 000	93 000 6 000
Sand and Gravel	\$ t		550 000 463 000	1 438 000 480 000	5 105 000 3 074 000	2 995 000 1 185 000	13 355 000 4 902 000	1 502 000 352 000	5 184 000 2 246 000	5 422 000 2 252 000
Sulphur (smelter gas)	\$ t					267 000 2 000	1 000 7	156 000 1 000	183 000 2 000	
Coal (E)	\$ t	287 000 16 529	368 000 20 860				209 000 17 223	440 000 20 000	100 000 10 000	420 000 40 000
Stone	\$ t							679 000 206 000		
TOTAL	\$	364 389 000	268 016 000	169 120 000	62 987 000	70 143 000	60 069 000	176 310 000	426 027 000	540 300 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.
(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential

**Table 6:
Mineral Production, Northwest Territories
1980-1989**

Mineral	1980	1981	1982	1983	1984	1985	1986	1987	1988(R)	1989(P)
Gold	\$ 96 920 000 kg 4 209	85 495 000 4 825	91 415 000 6 113	144 570 000 8 634	191 071 000 12 732	177 079 000 12 713	205 266 000 12 503	223 456 000 11 740	205 503 000 11 880	174 770 000 12 051
Silver	\$ 41 331 000 kg 53 000	13 456 000 33 000	16 073 000 51 000	33 743 000 74 000	20 361 000 59 000	9 083 000 33 000	5 478 000 22 000	4 006 000 13 000	6 923 000 26 000	4 250 000 20 000
Copper	\$ 679 000 kg 262 000	613 000 277 000	419 000 215 000	214 000 102 000	130 000 69 000	46 000 23 000	1 000 1 000	4 000 2 000	3 000 1 000	3 000 1 000
Lead	\$ 55 853 000 kg 51 337 000	44 680 000 45 522 000	46 367 000 63 955 000	47 981 000 81 161 000	66 647 000 90 198 000	44 489 000 77 083 000	91 129 000 133 836 000	139 370 000 131 744 000	52 223 000 51 502 000	38 998 000 37 426 000
Zinc	\$ 172 556 000 kg 175 685 000	159 764 000 133 604 000	229 110 000 213 523 000	269 951 000 234 883 000	386 813 000 274 920 000	356 415 000 284 223 000	322 064 000 265 073 000	328 781 000 258 070 000	537 756 000 325 321 000	728 401 000 336 911 000
Cadmium	\$ kg			10 000 3 000	1 034 000 214 000	866 000 238 000	670 000 175 000	501 000 86 000	3 172 000 166 000	4 410 000 269 000
Bismuth	\$ kg			163 000 32 000	34 000 3 000	60 000 3 000				
Antimony	\$ kg							141 000 44 000	55 000 19 000	25 000 10 000
Tungsten Trioxide (E)	\$ 67 646 000 kg 4 007 000	43 363 000 2 515 000	38 353 000 2 925 000	11 221 000 1 126 000	33 584 000 3 112 000	38 918 000 3 529 000	17 363 000 2 470 000			
Arsenious Trioxide (E)	\$ 561 000 t 1 094		3 862 000 1 780	2 345 000 982	5 837 000 4 684	1 969 000 4 098	254 000 406	666 000 X	2 366 000 X	1 248 000 X
Sulphur (smelter gas)	\$ t				98 000	11 665 000 147 000	21 788 000 59 000	6 912 000 6 000	7 286 000 73 000	2 069 000 21 000
Sand and Gravel	\$ t		41 482 000 6 625 000	32 479 000 5 905 000	36 323 000 7 249 000	8 981 000 6 803 000	3 281 000 986 000	8 132 000 2 183 000	10 966 000 2 443 000	10 841 000 2 182 000
Stone	\$ t		1 268 000 323 000	14 601 000 2 409 000	4 617 000 729 000	434 000 163 000	1 011 000 368 000	1 486 000 472 000	232 000 108 000	622 000 172 000
TOTAL	\$	434 985 000	347 841 000	468 349 000	557 198 000	649 732 000	668 452 000	713 310 000	826 487 000	965 638 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.

(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential



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INTRODUCTION

This report covers the activities of the mines and minerals sector of Yukon Territory and the Northwest Territories during the calendar year 1990.

The report was compiled by D.D. Brown of the Mining and Infrastructure Directorate of the Department of Indian Affairs and Northern Development (DIAND), Ottawa. Sections on mineral exploration are based on the 1990 mining exploration overviews produced by DIAND regional staff under the direction of S.R. Morison, Northern Affairs Program in Yukon Region and W.A. Padgham, Northern Affairs Program in the Northwest Territories Region. The glossary of terms appended to the report was written by D. Law-West of the Mining and Infrastructure Directorate, DIAND, Ottawa.

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SUMMARY

Yukon

The value of minerals produced in Yukon was estimated at \$541 million in 1990 compared with \$532 million in 1989. Most of the production was derived from two hardrock mines and 194 seasonal placer gold operations. The largest operation, Curragh Resources' Faro and Vangorda zinc-lead-silver mines, was the leading producer, followed by the 194 Yukon placer gold operations and Canamax Resources' Ketza River gold mine. Production at the Ketza River mine was suspended in September 1990 because of the depletion of economic oxide gold ore reserves.

The most significant development project was the beginning of construction, in September 1990, of a mill and tailings dam at the new Mt. Hundere zinc-lead-silver mine. This new \$70 million project, owned by joint-venture partners Curragh Resources Inc. and Hillsborough Resources Inc., will begin zinc and lead production by the fall of 1991, adding some 100 000 tonnes per year (tpy) of zinc and lead concentrate to Yukon's existing zinc and lead production. Curragh Resources also continued the development of its Vangorda and Grum zinc-lead-silver mines in the Vangorda Plateau area, east of Faro. The Vangorda open-pit mine started producing ore in the fall of 1990 to provide additional feed to the company's Faro mill.

Yukon's mineral exploration expenditures fell to less than \$11 million in 1990 from approximately \$18 million in 1989. The mineral exploration activities were directed to lead-zinc properties (47 per cent), gold and silver properties (45 per cent) and copper, jade and building stone (8 per cent).

Northwest Territories

Mineral production in the Northwest Territories was derived principally from seven producing hardrock mines, including five gold mines (Colomac, Con, Giant, Lupin and Ptarmigan mines) and two base metal mines (Nanisivik and Polaris). The value of mineral production in 1990 was estimated at \$906.4 million compared with \$960.7 million in 1989. Together, zinc and lead production accounted for 72.5 per cent of the total value, while gold accounted for 24.0 per cent.

The drop in the value of mineral production in 1990 compared with 1989 was due in part to a 10 per cent decline in zinc output and a 13 per cent decrease in zinc

prices in 1990 compared with a year earlier. Gold production in 1990 increased by 23 per cent over 1989 because of new output from the Colomac mine and higher gold output from the established Con, Giant and Ptarmigan mines.

The most significant development was the opening, in May 1990, of the \$166 million Colomac gold mine, owned by Northwest Gold Corp. However, by year-end, the mine had encountered a serious cashflow problem because of the shortfall in gold production from anticipated output.

Mineral exploration in the Northwest Territories was expected to drop to \$45 million in 1990, compared with approximately \$55 million in 1989. The number of exploration projects dropped to 92 in 1990 from 127 in 1989. Of the 92 projects, 60 were directed to gold, 21 to base metals and silver, three to uranium and seven to other metals.

SOMMAIRE

Yukon

En 1990, la valeur des minéraux produits au Yukon a été évaluée à 541 millions de dollars comparativement à 532 millions de dollars en 1989. La plus grande partie de la production provenait de deux mines en roche dure et de 194 entreprises d'exploitation saisonnière des placers. La plus grande entreprise, les mines de zinc, de plomb et d'argent de Faro et de Vangorda de la Curragh Resources, venait au premier rang des producteurs, suivie par les 194 entreprises d'exploitation des placers du Yukon et de la mine d'or de la rivière Ketza de la Canamax Resources. En septembre 1990, la production a été interrompue à la mine de la rivière Ketza en raison de l'épuisement des réserves de minerai d'or oxydé.

Le plus important projet fut le début de la construction, en septembre 1990, d'une digue à rejets à la nouvelle mine de zinc, de plomb et d'argent du mont Hundere. Ce nouveau projet, évalué à 70 millions de dollars et appartenant à l'entreprise en participation de la Curragh Resources Inc. et de la Hillsborough Resources Inc., commencera à produire du zinc et du plomb dès l'automne 1991, ajoutant ainsi quelque 100 000 tonnes par an (TPA) de concentrés de zinc et de plomb à la production actuelle du Yukon. La Curragh Resources continue à exploiter ses mines de zinc, de plomb et d'argent à Vangorda et Grum dans la région du Plateau Vangorda, à l'est de Faro. À l'automne de 1990, la mine à ciel ouvert de Vangorda commençait à produire du minerai destiné à alimenter l'usine de la société située à Faro.

La prospection minière du Yukon qui représentait environ 18 millions de dollars en 1989 a baissé à moins de 11 millions de dollars en 1990. Les activités en matière de prospection ont été orientées vers les propriétés de plomb et de zinc (47 p. 100), les propriétés d'or et d'argent (45 p. 100) et le cuivre, le jade et la pierre de construction (8 p. 100).

Territoires du Nord-Ouest

La production minière dans les Territoires du Nord-Ouest provenait principalement des sept mines en roche dure, y compris les cinq mines d'or (Colomac, Con, Giant, Lupin et Ptarmigan) et les deux mines de métaux communs (Nanisivik et Polaris). En 1990, la valeur de la production minière a été évaluée à 906,4 millions de dollars comparativement à 960,7 millions de dollars en 1989. La production de zinc et de plomb représentait 72,5 p. 100 de la valeur totale alors que celle de l'or s'élevait à 24 p. 100.

La chute enregistrée dans la valeur de la production minière en 1990 par rapport à 1989 est attribuable en partie à une baisse de 10 p. 100 de la production du zinc et à une diminution de 13 p. 100 des prix du zinc observée en 1990 par rapport à l'année précédente. La production d'or a accusé une hausse de 23 p. 100 comparativement à 1989 en raison de la production nouvelle de la mine de Colomac et de la production plus élevée constatée dans les mines d'or déjà établies comme Con, Giant et Ptarmigan.

Le projet le plus important est l'ouverture, en mai 1990, de la mine d'or de Colomac, évaluée à 166 millions de dollars et appartenant à la Northwest Gold Corporation. Cependant, à la fin de l'année, les exploitants de la mine ont éprouvé de sérieuses difficultés de trésorerie à la suite de la baisse de la production d'or par rapport à celle escomptée.

Dans les Territoires du Nord-Ouest, la prospection minière devait baisser à 45 millions de dollars en 1990, en comparaison des quelque 55 millions de dollars de l'année précédente. Le nombre de projets de prospection qui était de 127 en 1989 a baissé à 92. Sur les 92 projets, 60 étaient orientés vers l'or, 21 vers les métaux communs et l'argent, 3 vers l'uranium et 7 vers d'autres métaux.

MINES AND MINERAL ACTIVITIES 1990

Yukon

Mineral Production

The value of mineral production in Yukon during 1990 was estimated at \$541 million compared with \$532 million in the previous year. Curragh Resources Inc., with the largest mine operation in Yukon, produced zinc, lead and silver throughout the year from the Faro open-pit mine and from the Vangorda open-pit mine toward year end. Canamax Resources Ltd. suspended operations at its Ketz River gold mine in September 1990 because of the depletion of economic oxide ore reserves. Gold production from Yukon's placer mine operations continued to be second in value only to Curragh Resources zinc-lead-silver output. Placer gold production dropped for the first time in several years to 3 300.9 kg of fine gold or approximately 80 per cent of the output during the previous year.

The highlight of 1990 was the \$70 million development of the Mt. Hundere zinc-lead-silver mine. It is 80 per cent owned by Curragh Resources Inc. and 20 per cent owned by Hillsborough Resources Inc. The companies began construction of a 1 370 tonne per day (tpd) mill and a tailings dam during September 1990. The mine is scheduled to begin production by the fall of 1991.

Among a number of perspective exploration projects, Noranda Exploration Company Ltd. and Loki Gold Corporation defined a large tonnage of heap-leachable gold ore on the Brewery Creek property. However, total exploration activity in Yukon continued to decline significantly in 1990 as measured by expenditures of less than \$11 million compared with approximately \$18 million in 1989 and \$55 million in 1988.

Yukon's hardrock mine operations, comprising Curragh Resources' Faro mine and Canamax Resources' Ketz River mine, employed approximately 733 people directly during the first half of the year. At year end, only Curragh's Faro mine and its new Vangorda mine were operating. Together with development at the new Mt. Hundere mine, the hardrock operations employed 811 persons directly. Yukon's 194 placer mine operations employed an estimated 700 persons during the placer mining season.

Yukon accounted for 13.2 per cent of the zinc, 47.5 per cent of the lead and 2.8 per cent of the gold production in Canada during 1990. Yukon's metallic mineral production in 1990 amounted to 4.2 per cent of the total value of Canadian production compared with 3.8 per cent in 1989.

Mines

Canamax Resources Inc., Ketz River Mine

The company suspended operations at the Ketz River mine (a)* in September 1990 because the economic oxide ore reserves were depleted. The Ketz mill processed 135 939 t of ore grading 9.8 g per t of gold to yield 1 139.9 kg of gold compared with 1 216.1 kg of gold a year previously. The mine was placed on a care and maintenance basis. The company applied to the Yukon Territory Water Board for an amendment to its water licence to allow it to mine and process the gold-bearing sulphide ore reserves that have been defined on the property. Canamax is currently investigating the feasibility of mining the sulphide portion of the Ketz deposit.

Type:	underground and open pit
Location:	60 km south of Ross River
Product:	gold
Mill Capacity:	400 tpd
Tonnes Milled:	135 939 t
Oxide Reserves:	16 400 t (December 31, 1990)
Oxide Reserve Grade:	9.7 g/t gold
Employees:	112 (September, 1990)

* Numbers and letters in parenthesis indicate the location of the property on map 1 entitled Mineral Exploration and Mines, Yukon, 1990.

Table 1:
Mineral Production of Operating Mines, Yukon, 1988, 1989 and 1990

Company, Mine and Commodity	1988		1989		1990(P)	
	t	kg	t	kg	t	kg
Canamax Resources Inc. Ketza River Mine gold		635		1 216		1 140
Curragh Resources Corp. Faro Mine						
zinc	200 927		176 832		151 910	
lead	149 354		108 144		105 510	
silver		214 051		95 428		86 343

Source: Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

(P) = Preliminary

MAP 1 MINERAL EXPLORATION AND MINES, YUKON 1990

LEGEND



Producing Hardrock Mine

a Canamax Resources Inc.
Ketz River Mine, Au

b Curragh Resources Inc.
Faro and Vangorda Mines, Zn, Pb, Ag

c Archer, Cathro and Associates (1981) Ltd.
Keno Hill Operation, Ag

d Max Rosequist, King Arctic, Jade

1 to 8 Areas of Placer Mine Operations

20 Areas of Mineral Exploration Activity
Refer to Yukon Table and Text

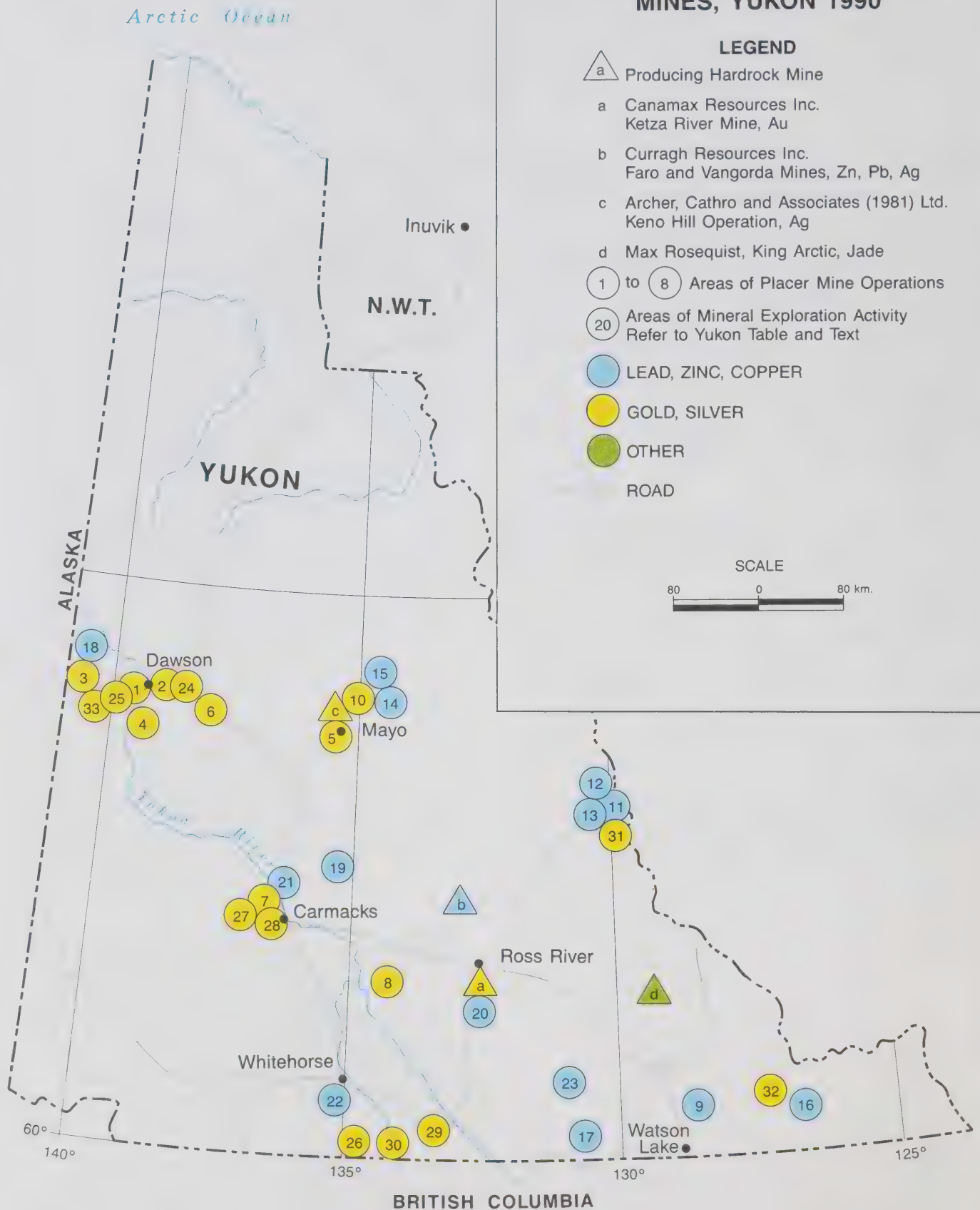
LEAD, ZINC, COPPER

GOLD, SILVER

OTHER

ROAD

SCALE



Curragh Resources Inc., Faro and Vangorda Mines

The company remains the leading mining operation in Yukon. During 1990, the Faro mill processed 4.7 million t of ore and recovered 359 444 t of zinc concentrate and 189 040 t of lead concentrate. This compares with 316 thousand t of zinc concentrate and 171 thousand t of lead concentrate during the previous year. The 1990 concentrate output contained 151 910 t of zinc, 105 510 t of lead and 86 343 kg of silver. During the year, ore at the Faro mine was extracted from both the Faro open pit and from underground workings near the pit. At year end, the Faro mine (b) together with the Vangorda open-pit mine (b), located 14 km southeast of the Faro mine, were supplying 13 000 tpd of ore to the mill. Surface stripping of overburden at the Vangorda mine was completed during the year.

Curragh is developing three zinc-lead-silver deposits in the Vangorda Plateau area (b) at a cost of \$142 million. In September 1990, Curragh received approval of its water licence to allow mining of the Vangorda and Grum open pits. The company's mine plan schedules the completion of ore production from the Faro underground deposit in September 1991 and the Faro open pit in December 1991, at which time the Faro reserves will be depleted. After 1992, the ore supply will be drawn entirely from the Vangorda and Grum open-pit mines and the DY underground mine, located 14 to 17 km southeast of the Faro mine. The Vangorda open pit will be exhausted by the end of 1992 and the shortfall will be made good from underground mine production in the DY ore deposit. An eight-year life is expected for the Grum open pit and the Grum deposit can be mined from underground in the early years of the next century.

Faro Mine and Vangorda Mine

Types: open pit and underground
 Location: 14 km north of Faro and 7 km east-northeast of Faro
 Product: zinc, lead, silver
 Mill Capacity: 13 500 tpd
 Tonnes Milled: 4.7 million t
 Reserves: at Faro and Vangorda Plateau Deposits (December 31, 1990)

	Tonnes (in thousands)	Zinc %	Lead %	Silver (g/t)	Gold (g/t)
Faro open pit	4 389	5.01	2.77	25	N/A
Faro underground	632	6.31	4.07	60	0.31
Faro stockpiles	3 078	3.46	2.38	26	N/A
Vangorda open pit	6 296	4.56	3.46	48	0.65
Grum open pit	25 161	5.01	2.96	50	0.81
DY underground	11 300	6.84	5.82	83	0.94
Total	50 856	5.28	3.62	54	N/A
Employees:	621 including contractors (December 31, 1990)				

N/A not available

Seasonal Mine Operations

Archer, Cathro and Associates (1981) Limited mined high-grade silver veins in the Keno Hill area (c) in 1990. The operation consisted of drilling, blasting, bulldozer trenching and hand-picking argentiferous galena and tetrahedrite-bearing ore from the vein material. Average grades shipped were approximately 13 700 g per t of silver on the Lucky Queen vein material and over 6 800 g per t of silver on the Keno #9 vein material. Over 100 t of hand-picked material were shipped during the year.

Max Rosequist continued to mine nephrite jade during the summer months on the KING ARCTIC property (d), near Frances Lake. He produced some 30 to 40 t of jade material from sheared ultramafic rocks for shipment to southern and overseas markets.

Placer Mining

Placer gold production from approximately 194 placer mine operations in 1990 amounted to 4 126.1 kg of crude gold (3 300.9 kg of fine gold) compared with 5 149.8 kg of crude gold (4 119.8 kg of fine gold) from approximately 220 operations in 1989. The 20 per cent drop in production in 1990 from 1989 is attributable to lower average gold prices in the second half of 1990 compared with the same period in 1989. There was a severe erosion in investor confidence because of declining gold prices. Depleting placer reserves and regulatory uncertainty may have also contributed to lower production.

The traditional placer mining areas provided 83.5 per cent of the gold output. These include the Indian River (1), Klondike (2), Sixty Mile and Forty Mile (3) and Lower Stewart River (4) drainage areas. Placer operations in the Mayo area (5), Clear Creek (6), Dawson Range (7) and Livingstone Creek (8) drainage areas provided the remaining production. The value of production was estimated at \$47.4 million in 1990 compared with \$59.7 million in 1989.

Development

In September 1990, joint-venture partners Curragh Resources Inc. and Hillsborough Resources Inc. began construction of a 1 370 tpd mill and a tailings dam to bring the new \$70 million Mt. Hundere zinc-lead-silver mine (9) into production. The mine is located 45 km north of Watson Lake. During the year, the committee administering the federal Environmental Assessment and Review Process (EARP) conditionally approved the mine project.

The mine development is expected to be completed for initial production in September, 1991. The open pit and underground mine operation will feed at least 1 000 tpd of ore to the mill for an output in excess of 100 000 tpy of zinc and lead concentrate. Reserves are estimated at 5 655 000 t of ore grading 12.68 per cent zinc, 4.73 per cent lead and 68.6 g of silver per t in four ore deposits. Over the life of the operation the mine is expected to produce 850 000 t of zinc concentrate averaging 70 per cent zinc and 260 000 t of lead concentrate at an approximate grade of 60 per cent lead.

The mine will employ 140 people over its projected life of eight to ten years. A 27 km haulage road, from the Robert Campbell Highway to the mill site, was being constructed during 1990. The concentrate will be transported by tractor trailer to the port of Skagway, Alaska, and most of the zinc concentrate output will be shipped to a smelter in Spain.

Development work at Mt. Hundere included 1 500 m of in fill diamond drilling, the completion of environmental studies for the EARP review and the collaring of two adit portals on Jewelbox Hill. The Yukon Territory Water Board issued a water licence for the project on January 31, 1991. At year end 1990, the project employed 190 contract personnel.

On the Vangorda Plateau, Curragh Resources Inc. continued its \$142 million development program to bring new zinc-lead-silver reserves into production. Curragh conducted stripping of the overburden material at the VANGORDA and GRUM deposits (b).

Falconbridge Limited's United Keno Hill Mines operation (10) closed in January 1989. Under an agreement with Falconbridge, Bharti Laamanen Mining Inc. was preparing the United Keno Hill operation for renewed production. Despite low silver prices, Bharti Laamanen was planning to start up the Onek open-pit and the Bellekeno underground mine in 1991 by using cost-efficient production methods.

Mineral Dispositions

The number of new quartz (hardrock) claims staked in 1990 exceeded the 1989 figures, but the number of placer claims and placer prospecting leases staked in 1990 decreased from the previous year.

Table 2: Mineral Dispositions Staked and Lapsed, Yukon, 1989 and 1990

	1990	1989
	calendar year	calendar year
	staked (lapsed)	staked (lapsed)
Quartz Claims	6 122 (10 380)	4 641 (8 339)
Placer Claims	1 503 (1 218)	2 022 (1 207)
Placer Leases to Prospect	261 (296)	277 (264)

Source: Department of Indian Affairs and Northern Development

Most new quartz claims staking was by two companies in the Dawson mining district, where they expanded large claim holdings.

Mineral dispositions in good standing at year end 1990 were lower by 2 418 dispositions compared with year end 1989.

Table 3: Mineral Dispositions in Good Standing, Yukon, 1989 and 1990

	1990	1989
	December 31	December 31
Quartz Claims	46 697	49 744
Placer Claims	17 741	17 103
Placer Leases to Prospect	345	351
Iron and Mica Claims	525	525
Coal Leases and Licences	36	36
Dredging Leases	12	15
Total	65 356	67 774

Source: Department of Indian Affairs and Northern Development

The lower number of dispositions in 1990 resulted mainly from the lapsing of a large number of quartz claims.

Mineral Exploration

Yukon experienced a continuing decline in mineral exploration in 1990 with expenditures falling to less than \$11 million compared with approximately \$18 million in 1989 and a record-high \$55 million in 1988.

At least 40 exploration programs were conducted during the year. A few major mining companies conducted advanced exploration, while junior mining companies conducted grassroots exploration on a more limited basis. Base metals and precious metals exploration programs were evenly split with 47 per cent of 1990 exploration focused on lead-zinc-(silver) properties and 45 per cent of exploration centred on gold and silver properties. Exploration for other minerals such as copper, jade and building stone accounted for the remaining 8 per cent of activity.

Exploration Projects

Base Metals

High base metals prices prompted renewed interest in several base metals properties with known tonnage such as the TOM, JASON, MEL and BLENDE zinc-lead-(silver-copper-gold) deposits and the WILLIAMS CREEK copper-gold deposit.

Table 4:
Exploration Drilling in Yukon, 1990

Project	Company	Diamond Drilling		Percussion Drilling	
		Metres	No. of holes	Metres	No. of holes
TOM	Cominco	3 578	7		
NIDD	Cominco	1 352	6		
JASON	Phelps Dodge	2 667	12		
MEL	Barytex	1 552	11		
MARG	NDU/Cameco	4 267	10		
BLENDE	NDU/Billiton	3 657	15		
HYLAND GOLD	NDU/et al			3 800	41
LONESTAR	Abor/et al			3 048	50
BREWERY CREEK	Noranda/Loki	1 290	21	14 838	309
MT HUNDERE	Curragh	1 500	25		
DROMEDARY	Dromedary Exploration	434	2		
JUBE	Dunvegan	263	8		
GODDELL	Skukum/Berglynn	1 250	6		
ROSSBANK	Inco	583	3		
KETZA RIVER	Canamax	2 619	35		
GRAFTER	Aurora Gold			500	4
WILLIAMS CREEK	WCH/Thermal	3	2		
TOTAL		25 015	163	22 186	404

Source: Department of Indian Affairs and Northern Development

In the Macmillan Pass area, northeast of Ross River, Cominco Ltd. under an option agreement with Hudson Bay Mining and Smelting Co. Limited continued its drill program to test the west and southeast zones of the TOM (11) stratiform zinc-lead-silver deposit. A 3 578.7 m diamond drill program was completed. Previously, Hudson Bay Mining and Smelting estimated the reserves of the TOM deposit to be 9 283 700 t grading 7.49 per cent lead, 6.19 per cent zinc and 69.4 g per t of silver using a 7 per cent combined zinc plus lead cut-off grade. Cominco also completed 1 352.3 m of diamond drilling on the NIDD (12) sediment-hosted zinc property, located 20 km northwest of the TOM property. The NIDD property is wholly owned by Cominco.

Also in the Macmillan Pass area, Phelps Dodge Corporation of Canada Ltd. acquired an option to earn 60 per cent interest in the JASON zinc-lead-silver property (13) from Western Canadian Mining Corporation, Ogilvie Mineral Corp. and Abermin Corporation. In 1990, Phelps Dodge completed 12 diamond drill holes totalling 2 667 m to test targets outside the identified mineralized zone of the Jason deposit. The deposit contains geological reserves in three zones amounting to 14.1 million t, grading 7.09 per cent lead, 6.57 per cent zinc and 79.9 g per t of silver using a cut-off grade of 8 per cent combined lead plus zinc.

Some 50 km northeast of Elsa, NDU Resources Inc. and Cameco completed 10 diamond drill holes totalling 4 119 m on the MARG zinc-lead-copper-silver-gold property (14). In November, NDU Resources announced drill-indicated diluted reserves of 2 857 600 t, grading 1.62 per cent copper, 2.25 per cent lead, 4.17 per cent zinc, 55.9 g per t of silver and 0.89 g per t of gold using a minimum mining width of 3 m. Drilling extended the area of mineralization defined by the 38 diamond drill holes, totalling 7 856 m, that were completed during 1988 and 1989. The deposit consists of four tabular massive sulphide lenses plus several smaller lenses in Mississippian phyllite and quartzite. The reserve blocks have an average thickness of 6 m.

The BLENDE property (15), located 5 km north-northwest of the MARG property, was drilled by Billiton Metals Canada Incorporated, under an agreement to earn 50 per cent interest in the property. The property is currently 100 per cent owned by NDU Resources Ltd. The 1990 diamond drill program outlined one lead-zinc-silver mineralized zone, 610 m long. Mineralization occurs in a tabular stockwork and breccia zones cutting Proterozoic dolomite. The mineralization consists of sphalerite,

galena and siderite with traces of quartz, pyrite, chalcopyrite and tetrahedrite.

Preliminary reserves of the BLENDE deposit have been calculated at 11.5 million t grading 2.2 per cent zinc, 3 per cent lead and 50 g per t of silver. The estimates were based on the results from holes drilled in 1990 along a 500 m section of the mineralized fault complex using a minimum open-pit width of 430 m and a cut-off grade of 1 per cent zinc and 1 per cent lead and a stripping ratio of 2.1 to 1 overburden to ore. The only previous drilling of the property consisted of three holes completed in 1989. Billiton is planning additional metallurgical tests, environmental studies and at least 12 000 m of diamond drilling in 1991.

East-northeast of Watson Lake, Barytex Resources Corp. explored the MEL (16) stratabound discordant zinc-lead-barite deposit as part of an option agreement with Breakwater Resources Ltd. The exploration program included drilling and trenching on the MAIN deposit and the newly discovered JERI showing, located 4.5 km east of the MAIN deposit. Eleven diamond drill holes were completed to upgrade the reserves from a drill-indicated to a mineable category. Geological reserves are 5 260 000 t grading 7.86 per cent zinc, 2.09 per cent lead and 48.98 per cent barite. Grade and thickness of the deposit appear to increase with depth.

West of Watson Lake, First Yukon Silver Resources continued trenching on the DAN (formerly BAR) property (17) near Swift River. Trenching exposed sheared and fractured calc-silicate rocks containing massive black sphalerite. The CRESCENT showing, located 3 km northwest of the DAN showing, exhibits similar characteristics in both host rock and mineralization.

In the Forty Mile River area, Archer Cathro and Associates (1981) Ltd., acting on behalf of YGC Resources, began an assessment of the MICKEY (18) showing. Galena and bedded barite occur in limy phyllite on the property. Limited exploration was also conducted by YGC Resources on the BOAR base-metal prospect, near Matson Creek.

Dromedary Exploration Company Ltd. completed two diamond drill holes on the DROMEDARY MOUNTAIN property (19). One of the holes intersected 43 m of massive pyrite and pyrrhotite containing traces of galena and sphalerite.

Yukon Minerals Corporation conducted trenching and sampling on the KETZA (20) project on Groundhog Creek, south of Ross River. The exploration program successfully expanded known mineralized zones and led to the discovery of the OTTER zone, which comprises stratiform mineralization explored over a strike length of 200 m. Assay returns included 7.5 per cent zinc, 2.7 per cent lead and 18 g per t of silver over a width of 2 m.

Thermal Exploration and Western Copper Holdings, an affiliate of Teck Corporation, acquired an option on the WILLIAMS CREEK copper property (21) in 1989, from its owner, Archer Cathro and Associates (1981) Ltd. The deposit is located west of Carmacks and has reserves of 16.3 million t grading 1.15 per cent copper and 0.68 g per t of gold, using a cut-off grade of 0.6 per cent copper. The deposit comprises both oxidized and sulphide reserves. In the fall of 1990, three diamond drill holes were completed to test a zone containing higher grade gold within the copper deposit. The oxide ore could be mined by open-pit methods. A solvent extraction - electrowinning plant capable of producing 30 t per day of copper would be used if the property is developed for production.

Aurora Gold Ltd. drilled four reverse-circulation rotary drill holes in the Whitehorse Copper Belt, south of the GRAFTER deposit (22). One hole intersected two zones of copper mineralization, with a 30 m intersection averaging 1.49 per cent copper, 0.377 g per t of gold and 6.17 g per t of silver. A 17 m intersection averaged 1.93 per cent copper, 0.54 g per t of gold and 14.1 g per t of silver.

Placer Dome Inc. conducted an airborne geophysical survey over its FYRE LAKE copper-zinc-silver property (23), located northwest of Watson Lake.

Precious Metals

Approximately one half of the 1990 exploration activity was directed to gold and silver properties.

On the BREWERY CREEK property (24), east of Dawson, Loki Gold Corporation and Noranda Exploration Company Limited trenched and drilled approximately 200 holes during 1990 to test the strike and down-dip extensions of several mineralized zones and to explore previously untested targets outlined by geochemical sampling. In February 1981, Noranda estimated the total preliminary reserves of the

BREWERY CREEK deposit at 10.07 million t grading 1.79 g per t of gold. The preliminary oxide reserve is the most significant, amounting to 7.44 million t at a grade of 1.89 g per t of gold. Preliminary tests of the oxidized material using cyanide leaching have given excellent recoveries for either heap leaching or conventional mill processing of the ore.

In the Dawson area, Arbor Resources Inc. explored the LONESTAR property (25). The company completed 3 000 m of percussion drilling in 50 holes to test seven gold targets within the 3 000 claim property. The targets included IP (induced polarization), magnetometer and geochemical anomalies.

In the Wheaton area, Skukum Creek Inc. and Berglynn Resources Inc. explored the GOLDEN TUSK zone of the GODDELL property (26). The GOLDEN TUSK zone is a hydrothermally altered shear zone intruded by felsic and intermediate dikes, which cut Cretaceous quartz monzonite. Six diamond drill holes tested the extension of the GODDELL discovery and numerous intersections yielded gold assays.

Doron Explorations Inc. constructed a mill to process a bulk sample mined from an exposed gold-bearing vein on the Caribou Creek property (27), located northeast of Carmacks on Mt. Freegold. The vein was stripped over a length of 1 300 m.

Aurchem Exploration continued exploration on the GOULTER property (28), located west of Carmacks, adjacent to the MT. NANSEN property of BYG Natural Resources Inc. The GOULTER property includes the Willow Creek and Eliza zones. Exploration in 1990 concentrated on the Eliza zone, where a geophysical survey traced the steeply dipping shear zone over a distance of 1 km. The zone exceeds 150 m in width and contains quartz vein material.

Dunvegan Exploration Ltd. conducted diamond drilling, trenching and metallurgical test work on the TOG property (29), located northeast of Carcross. Gold-bearing quartz veins and quartz-carbonate alteration occur in faults, and mineralization consists of gold associated with malachite, azurite, pyrite, galena and sphalerite.

Feather Gold Resources Ltd. conducted an extensive bulldozer trenching program on seven veins on the PEERLESS property (30), on Montana Mountain, near Carcross.

Noranda Exploration Company Limited conducted grassroots exploration on the ITSI and PUTZ-BENNETT properties (31), near Macmillan Pass. The target is gold-bearing quartz veins, which form ladder structures in dikes along the margins of Cretaceous intrusions.

NDU Resources Ltd., Silverquest Resources Ltd. and Adrian Resources Ltd., as principals in the Hyland Gold Joint Venture, explored the HYLAND GOLD (QUARTZ LAKE) property (32), northeast of Watson Lake. Bulldozer trenching and more than 3 800 m of rotary drilling were completed in more than 41 holes. The 1990 program tested a 2.5 km-long gold-arsenic-bismuth soil geochemical anomaly. The drilling confirmed that gold occurs at the contact between quartzite and phyllite in relatively flat-lying jasperoid and altered and brecciated quartzite in the Proterozoic Hyland Group. Gold is associated with quartz carbonate veins, graphitic shears and quartz-limonite breccias within steep north-trending fault zones.

Southwest of Dawson, Tombstone Explorations Ltd. conducted bulldozer trenching, chip sampling and soil sampling on the CONNAUGHT (33) copper-gold skarn deposit. Geochemical surveys, geochemical mapping and sample assaying were conducted on the LORRIE property (33), in the Tombstone Mountains, southwest of Dawson.

MINES AND MINERAL ACTIVITIES 1990

Northwest Territories

Mineral Production

In 1990, mineral production in the Northwest Territories (N.W.T.) was derived principally from seven producing hardrock mines, including five gold mines and two base-metal mines. The value of mineral production was estimated at \$906.4 million in 1990 compared with \$960.7 million a year earlier. Zinc production fell by 10 per cent in 1990 compared with a year earlier, principally because shipments from Pine Point Mine's stockpile were lower than during the previous year. In addition, zinc prices dropped approximately 13 per cent from 1989 to 1990. Gold production in 1990 increased by 23 per cent compared with a year earlier, because of new production from Northwest Gold Corp.'s Colomac mine and higher gold output from NERCO's Con mine, Giant Yellowknife's Giant mine and Treminco's Ptarmigan mine. The average gold price in 1990 was only slightly lower than in 1989.

Together, lead and zinc accounted for 72.5 per cent of the total value of N.W.T.'s mineral production, while gold accounted for 24.0 per cent.

The new 10 000 tpd Colomac gold mine began production in May 1990 as the largest ore producer in the N.W.T. By the end of 1990, it became increasingly evident that this large-tonnage, low-grade mine was failing to meet anticipated levels of gold production, and the fate of the mine depended on new financing to provide for the shortfall in working capital.

Exploration in the N.W.T. continued to decline from previous levels, and expenditures were expected to drop to \$45 million in 1990 compared with approximately \$55 million in the previous year. The decline is attributed to the replacement of the Flow-Through Share Income Tax Program by the Canadian Exploration Incentives Program, as vehicles for exploration financing. Downward trending gold prices, higher interest rates and uncertainty related to the northern comprehensive native land claims were also cited as factors.

The mineral industry in the N.W.T. accounted for 24.7 per cent of the zinc, 17.0 per cent of the lead and 9.1 per cent of the gold produced in Canada during 1990. The value of these metals combined with by-product silver, bismuth and cadmium accounted for 6.9 per cent of Canada's metallic mineral production, compared with 6.7 per cent in 1989.

The seven operating mines in the N.W.T. directly employed 1 950 persons during 1990 compared with 1 692 in 1989.

Mines

Cominco Ltd., Pine Point Mine

In 1990 Cominco Ltd. surrendered its 50.1 per cent equity interest in Pine Point Mines Limited. As part of the same transaction Cominco acquired a 100 per cent interest in the remaining operations at Pine Point.

Pine Point closed its zinc-lead mine (f) at Pine Point in 1987. During 1990, the company continued to ship concentrate to markets from its stockpiles at Pine Point. In April, 1990 much of the lead and zinc stockpiles had been delivered to smelters and the Pine Point mill was re-started to re-recover concentrate mixed with the sand and gravel-base pads of the stockpile. The company completed shipment of zinc concentrate in September 1990, but shipments of lead concentrate were expected to continue to into 1991.

Cominco Ltd., Polaris Mine

Cominco Ltd. owns 77.5 per cent of the Polaris zinc-lead mine (b)* on Little Cornwallis Island and Pine Point Mines Limited owns 22.5 per cent. Polaris set new records for both tonnage milled and zinc concentrate produced in 1990. The mill processed 1 017 200 t of ore to produce 227 100 t of zinc concentrate grading 62.7 per cent zinc and 48 200 t of lead concentrate grading 78.2 per cent lead. Eleven shipments of lead and zinc concentrate were made to Europe between August 1 and October 25, 1990, for a record total of 285 300 t shipped. Capital expenditures for 1990 included \$2.7 million for replacement of equipment and the completion of the Keel Zone haulage system.

Table 5:
Mineral Production of Operating Mines, Northwest Territories, 1988, 1989 and 1990

Company, Mine and Commodity	1988		1989		1990(P)	
	t	kg	t	kg	t	kg
Cominco Ltd. Polaris Mine zinc lead	134 800 34 200		139 190 32 060		142 392 37 692	
Echo Bay Mines Ltd. Lupin Mine gold		6 297		6 082		6 072
Giant Yellowknife Mines Ltd. Giant Mine gold		2 224		3 270		3 647
Nanisivik Mines Ltd. Nanisivik Mine zinc lead silver	63 100 1 000	22 200	57 328 2 448	16 956	56 200 1 400	18 100
NERCO Con Mine Ltd. Con Mine gold silver		2 551 510		2 992 621		3 643
Northwest Gold Corp. Colomac Mine gold						2 130
Treminto Resources Ltd. Ptarmigan Mine gold		416		478		585


Source: Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

(P) = Preliminary



MAP 2 MINERAL EXPLORATION AND MINES NORTHWEST TERRITORIES, 1990

LEGEND

 a Producing Mines

a Giant Yellowknife Mines Ltd., Au, Ag
Nerco Con Ltd. (Con Mine), Au, Ag
Tremco Resources Ltd., (Ptarmigan Mine), Au, Ag


b Cominco Ltd., (Polaris Mine), Pb, Zn

c Nanisivik Mines Ltd., (Nanisivik Mine), Pb, Zn, Ag

d Northwest Gold Corp., (Colomac Mine), Au, Ag

e Echo Bay Mines Ltd., (Lupin Mine), Au, Ag

f Cominco Ltd. (Pine Point Mine), Pb, Zn
(Shipping concentrate only)


 20 Areas of Mineral Exploration Activity
Refer to N.W.T. Table and Text

SCALE



Road

 Areas of Exploration Activity
Refer to N.W.T. Table and Text

 URANIUM

 GOLD, SILVER

 ZINC, LEAD, COPPER

MAP 3
MINERAL EXPLORATION AND MINES
IN SLAVE STRUCTURAL PROVINCE, 1990

LEGEND

(20) Areas of Mineral Exploration Activity,
Refer to N.W.T. Table and Text

Gold, Silver

Zinc, Lead, Copper

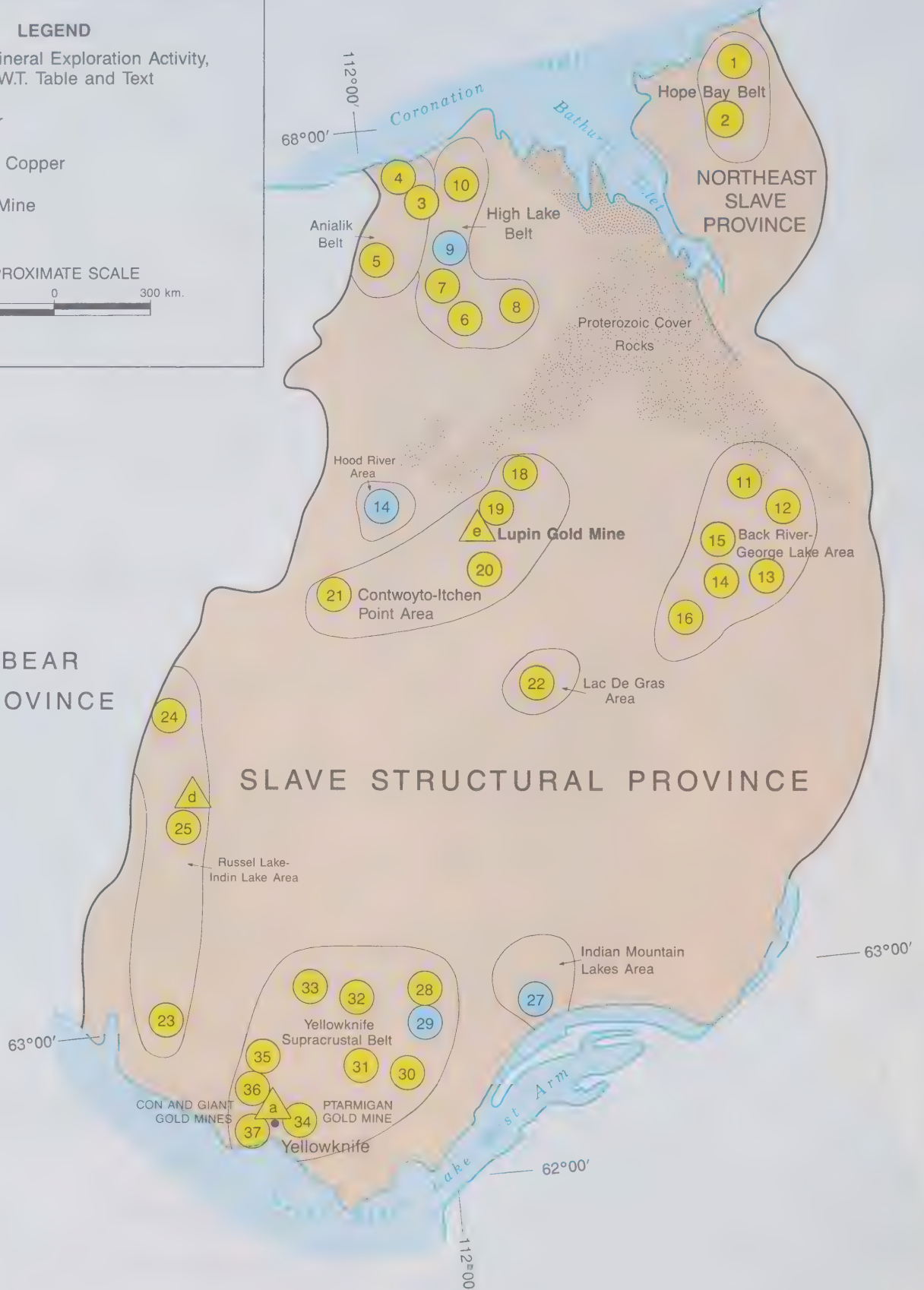
Producing Mine

APPROXIMATE SCALE
300 0 300 km.

BEAR
PROVINCE

SLAVE STRUCTURAL PROVINCE

NORTHEAST
SLAVE PROVINCE



Type:	underground
Location:	Little Cornwallis Island (120 km northwest of Resolute)
Mill Capacity:	3 100 tpd
Tonnes Milled:	1 017 200 t
Reserves:	11.793 million t (December 31, 1990)
Reserve Grade:	14.1 per cent zinc, 3.8 per cent lead
Employees:	274 (December 31, 1990)

Echo Bay Mines Ltd., Lupin Mine

The Lupin gold mine (e) is located 90 km south of the Arctic Circle and approximately 400 km northeast of Yellowknife. In 1990, the Lupin mill processed 1 726 t of ore per day for a total of 629 000 t with an average grade of 10.29 g of gold per t. This compares with 1 717 t of ore per day for a total of 625 000 t with an average grade of 10.35 g of gold per t in 1989. The 1990 gold production amounted to 6 072.4 kg compared with 6 082.4 kg a year earlier. During 1990 the mine shaft was deepened to about 4 000 feet (1 219 m) from its previous depth of 3 120 feet (951 m). The spiral underground ramp was deepened to about 3 080 feet (939 m) from 2 460 feet (750 m). At year end 1990, the company had about nine years of reserves at current production rates, with no indication that the Lupin ore body is bottoming out at depth.

Type:	underground
Location:	400 km northeast of Yellowknife
Product:	gold
Mill Capacity:	1 600 - 2 000 tpd
Tonnes Milled:	629 000 t
Reserves:	4.04 million t (December 31, 1990)
Reserve Grade:	10.66 g/t gold
Employees:	413 (December 31, 1990)

* Numbers or letters in parenthesis indicate the location of the property on map 2, in the centrefold, entitled Mineral Exploration and Mines, Northwest Territories, 1990.

Giant Yellowknife Mines Ltd., Giant Mine

In November 1990, Royal Oak Resources Limited purchased control of the Pamour Group of companies, which includes Giant Yellowknife Mines, giving Royal Oak a 41.7 per cent equity interest in Giant Yellowknife Mines Ltd. at a cost of \$33 million. Royal Oak also acquired a direct 16.6 per cent interest in Giant Yellowknife Mines.

In June 1990, mining of the A-1 and B-1 open-pit mines was completed at the Giant mine (a). Future production will come entirely from the underground operation. During the year, the Giant mill processed 347 079 t of ore at an average grade of 9.942 g per t of gold. This compares with 357 417 t of ore grading 8.325 g per t of gold in 1989.

In 1990, the tailings retreatment plant processed 694 156 t of tailings at 2.408 g per t of gold and recovery of 28.2 per cent compared with 992 644 t of tailings grading 2.08 g per t of gold and recovery of 28.6 per cent in 1989. In October, the plant was closed because of the onset of cold weather.

Total bullion recovered from the conventional milling and tailings retreatment amounted to 3 646 976 g in 1990 compared with 3 270 406 g in 1989.

In January 1990, 29 mine employees were laid off as the company took measures to cut costs. In December 1990, when Royal Oak closed the tailings retreatment plant indefinitely because it was uneconomic, 28 people were laid off. The workforce was reduced to 335 employees compared to approximately 400 at the beginning of the year.

Type:	underground and openpit
Location:	2.4 km north of Yellowknife
Product:	gold
Mill Capacity:	1 000 t pd
Tonnes Milled:	382 591 t
Reserves:	2.99 million t
Reserve Grade:	10.18 g/t gold

Tailings Retreatment Plant

Capacity:	9 070 tpd
Tonnes Processed:	694 156 t
Reserves:	Nil
Employees:	335 (December 31, 1990)

Nanisivik Mines Ltd., Nanisivik Mine

Nanisivik Mines Ltd. is wholly owned by Conwest Exploration Company Limited. In June, 1990 Conwest Exploration Company Ltd. amalgamated with its 51 per cent owned subsidiary Mineral Resources International Limited.

In 1990, production at the Nanisivik mine (c) amounted to 716 400 t of ore grading 8.1 per cent zinc, 0.4 per cent lead and 35 g per t of silver compared with 706 000 t of ore grading 8.4 per cent zinc, 0.4 per cent lead and 32 g per t of silver in 1989. Approximately 45 per cent of the mill feed came from the Main Zone and the remainder from satellite deposits. The mill output was 100 700 t of zinc concentrate and 2 600 t of lead concentrate containing 56 200 t of zinc, 1 400 t of lead and 18 100 kg of silver. Shipments, principally to European smelters, totalled 102 700 t of zinc concentrate and 3 000 t of lead concentrate.

Approximately 25 per cent of the employees at the Nanisivik mine are drawn from the Inuit population of the Northwest Territories. Twenty per cent of employees at the mine are women.

Type:	underground
Location:	27 km east of Arctic Bay, Baffin Island
Product:	zinc, lead, silver
Mill Capacity:	2 000 tpd
Tonnes Milled:	716 400 t
Reserves:	2 618 000 t (December 31, 1990)
Reserve Grade:	8.5 per cent zinc, lead N/A, silver N/A
Employees:	216 (November 30, 1990)

NERCO Con Mine Ltd., Con Mine

NERCO Con Mine Ltd. is a unit of NERCO Minerals Company and both are wholly owned by NERCO Inc.

From the time of acquisition of the Con gold mine (a) in late 1986 to year end 1989, NERCO Con Mines Ltd. invested approximately US \$50 million to modernize and expand the mining and milling rates of the Con mine. Since 1987, the cash production costs at the mine have been reduced 25 per cent, largely by mechanization of mining. Mill capacity has been increased by more than 25 per cent to reach 1 000 tpd in early 1991.

In 1990 a 50-year production record was attained. The mine produced 3 642.7 kg of gold from 285 960 t of ore milled, compared with 2 922 kg of gold from 243 620 t of ore milled in 1989. Underground ore production was from the 3 900, 4 100, 4 500 and 5 500-foot levels accessed from the Robertson shaft. Development work was conducted on the 5 700 and 5 900-foot levels. In June, NERCO also began using the rehabilitated C1 shaft to hoist ore from the 2 300 and 2 900-foot levels. The 2 600 foot level was also rehabilitated for production.

By year end, the Campbell shear, the largest host structure for ore zones, had been explored by approximately 54 900 m of underground drilling. The exploration and development work increased ore reserves significantly.

Early in 1991, a public hearing was held in Yellowknife to review the proposed \$19.4 million autoclave pressure oxidation circuit that will be added to the existing mill by late 1992 to produce additional gold from the refractory arsenopyrite-bearing ore. The project is expected to create 21 new jobs.

Type:	underground
Location:	1.4 km south of Yellowknife
Product:	gold, silver
Mill Capacity:	1 000 tpd
Tonnes Milled:	285 960 t
Reserves:	3.11 million t (December 31, 1990)
Reserve Grade:	10.32 g/t gold
Employees:	371 (December 31, 1990)

N/A = not available

Northwest Gold Corp., Colomac Mine

Northwest Gold Corp., the owner and operator of the Colomac gold mine (d), is 52 per cent owned by Northgate Exploration Ltd. In May 1990, ABM Gold Corp. was renamed Northwest Gold Corp. to identify the company more closely with its mine operation in the N.W.T. Construction of the mine facilities, including a 10 000 tpd mill, was completed in March 1990, one year after construction began. Total cost of the facility was \$166 million. Pre-stripping and mining of the Zone 2 open pit began in August, 1990.

Milling of ore at the Colomac mine began in May 1990, and the first gold bar was poured on May 29, 1990. By mid-1990, the mine was producing 35 000 tpd of ore and waste compared with a full planned capacity of 40 000 tpd. The mill processed an average of 5 216 tpd compared with its 10 000 tpd nameplate capacity. By year end 1990, 2 129.97 kg of gold were produced from ore containing an average of 1.89 g per t of gold.

In November 1990, Northwest Gold Corp. wrote down the \$151.7 million carrying value of the Colomac mine, because of the lower-than-expected gold production realized since startup in May, low gold prices and the mine's ongoing financial requirements. In December 1990, layoff notices were sent to 50 employees at the mine. At year end, the company was rescheduling \$7.5 million in debt repayments. In February 1991, the future of the mine appeared precarious because of the financial restructuring needed to continue the operation.

Type:	open-pit
Location:	219 km north-northwest of Yellowknife
Product:	gold
Mill Capacity:	10 000 tpd
Tonnes Milled:	N/A
Reserves:	N/A
Reserve Grade:	N/A
Employees:	279 (December 31, 1990)

N/A: Not available

Tremingo Resources Ltd., Ptarmigan Mine

The company mined ore on the 450 and 750 foot levels of the Ptarmigan mine (a) and broken ore was hoisted from the 150 and 350 foot levels. The company reached the 180 tpd nameplate capacity of the Ptarmigan mill during the second half of 1990. Production during the fiscal year ending July 31, 1990 amounted to 558.46 kg of gold from 56 996 t of ore processed. In the first half of the company's 1991 fiscal year ending December 31, 1991 production amounted to 263.23 kg of gold from 25 129 t of ore processed.

Tremingo Resources explored the area between the Ptarmigan mine and its nearby Tom mine, located 1.6 km from the Ptarmigan mine, by completing approximately 2 440 m of drilling. A sizeable gold-bearing zone was delineated in the "C" vein located 300 m south of the Tom mine and 1 200 m north of the Ptarmigan vein. At the Tom mine, a 335 m long decline to the "C" vein was completed in December 1990 and the vein is being developed for production in 1991.

Tremingo Resources, under an option agreement with Giant Yellowknife Mines Ltd. plans to test mine the Crestaurium gold property, located near Yellowknife. Open-pit material from Crestaurium property will be used to supplement production from the Ptarmigan and Tom mines, if feasible.

Type:	underground
Location:	20 km east of Yellowknife
Mill Capacity:	180 tpd
Tonnes Milled:	56 996 t (fiscal year 1990 ended July 31, 1990)
Reserves:	146 963 t (July 31, 1990)
Reserve Grade:	11.013 g/t gold
Employees:	40 (December 31, 1990)

Development

Following 14 months of construction and mine development, Northwest Gold Corp. brought its Colomac gold property (d) into production in May 1990. The operation is described in the preceding section under the caption "Northwest Gold Corp., Colomac Mine".

In early July 1990, Urangesellschaft Canada Ltd. announced that it had asked the Federal Environmental Assessment Review Office (FEARO) to delay indefinitely the ongoing environmental assessment review public hearings on the company's proposed development of its Kiggavik uranium mine project on the LONEGULL claim block (54), located west of Baker Lake.

Mineral Dispositions

In 1990, the number of claims recorded and claims in good standing in the N.W.T. declined by 22 per cent and 5 per cent respectively from the previous year.

Table 6:
Mineral Claims Recorded, Cancelled and in Good Standing, Northwest Territories, 1989 and 1990

	1990 calendar year	1989 calendar year
Claims recorded (hectares)	441 (355 346)	712 (456 987)
Claims cancelled (hectares)	1 037 (563 548)	249 (419 353)
Claims in good standing (hectares)	15 348 (2 947 349)	15 945 (3 155 551)

Source: Department of Indian Affairs and Northern Development

Mineral Exploration

Mineral Exploration expenditures in the N.W.T. in 1990 were expected to drop to approximately \$40 million compared with expenditures of approximately \$55.5 million in 1989. The decline was attributed to the replacement of the Flow-Through Share Program by the Canadian Exploration Incentive Program, as tax-shelter programs to support mineral exploration investment. In addition, a downward trend in gold prices, uncertainty

related to the northern comprehensive land claims and higher interest rates were cited.

The number of exploration projects dropped to 92 from 127 in 1989 and 157 in 1988. Of the 92 projects in 1990, 60 were directed to gold exploration, 21 to base metals and silver, 3 to uranium and 7 to other metals.

Table 7:
Diamond Drilling, Northwest Territories, 1989 and 1990

	1990 calendar year	1989 calendar year
	metres (m)	
Surface Drilling	113 933	79 763
Underground Drilling	74 745	81 158
Total Drilling	188 678	160 921

Source: Department of Indian Affairs and Northern Development

Exploration Projects

Northern Slave Structural Province

Hope Lake Belt

In the Hope Bay Belt, Noranda Exploration Company Ltd. drilled the Wombat (Granite) showing on the CAPE-DOK-LARK claim group (1), under an option agreement with Abermin Corporation. Channel sample results include 18.23 g per t of gold over 3.5 m and 13.42 g per t of gold over 5.6 m.

Also in the Hope Bay Lake area, BHP-Utah Mines Ltd. conducted reconnaissance exploration. The company staked the KAMIK claims (2).

Anialik River Belt

In the east central Anialik River volcanic belt, south of Coronation Gulf, Covello, Bryan and Associates completed nine drill holes at five widespread sites on the TAM, TELLY, JOY and ANIALIK claims (3) for a total of 606 m. One hole totalling 81 m was completed on the CHAR group (4), where additional claims were staked. All work was conducted on behalf of Continental Pacific Resources Ltd.

In the south Anialik Belt, BHP-Utah Mines Ltd. conducted reconnaissance mapping and prospecting on Prospecting Permit 1181 (5), which includes the company's ARNICA claim group.

High Lake Belt

In the southern part of the High Lake volcanic belt (6), BHP-Utah Mines Ltd. conducted an extensive program, including the completion of 100 drill holes on the ULU claims. Additional work included a small drill program on the PULSE claims and geophysical surveys on the DEN and FIDO claim groups, optioned from Aber Resources Ltd. On FIDO 3, five drill holes totalling 174 m were completed. The company staked the BAMAKO and PARIS claims in the central part of the High Lake belt (7) and conducted grassroots exploration on the HOTEL claims, in the east arm of the belt (8).

BHP-Utah Mines Ltd. prospected and mapped the ROMA claim group (9), located east of the High Lake base metal property and completed a geophysical survey and geological mapping on the CYGNET claims (10), at the north extremity of High Lake.

In the northern part of the High Lake Belt, Covello, Bryan and Associates mapped the High Lake property (9), which contains the High Lake volcanogenic copper-zinc-lead-silver deposit. The work was conducted for Kennco Explorations (Canada) Limited, the owner of the property. Covello, Bryan and Associates, on behalf of Continental Pacific Resources Ltd., completed three drill holes totalling 232 m on the MONA claims and one drill hole totalling 63 m on the CHARLIE claims (9). Continental Pacific resources also staked the nearby JON and KATH claims.

On the KLC property (9), south of High Lake, Cominco Ltd. drilled two holes to test a geophysical conductor. The conductor proved to be caused by graphite.

George Lake - Back River Area

Gold-bearing iron formation is the principal exploration target in this area. In the George Lake Belt, Trigg Woollett Olson Consulting Ltd. managed a major exploration program on the BRAU claims (1), on behalf of the George Lake Joint Venture, comprising Homestake Mining Company Ltd. and Kerr-McGee Corporation. Work included magnetometer and VLF-EM geophysical surveys, geological mapping and completion of 159 drill holes totalling 28 000 m. This program has been going on since 1985.

Adjacent to the BRAU claims (11), Echo Bay Mines Ltd. conducted reconnaissance mapping and prospecting on the RAP-WR-IPG-PEW-SEL-LOW claim group, that was optioned from Aber Resources Ltd. In the same area, Cogema Canada Ltd. explored for vein-type gold deposits on the DEX claims.

At Boot Lake (12), Trigg, Woollett Olson Consulting Ltd. mapped and completed ground geophysical surveys on another group of BRAU claims. At Needle Lake (13), the company drilled 13 holes totalling 1 300 m on a third group of BRAU claims. Work at Needle Lake, Boot Lake and other smaller projects in the area was conducted on behalf of the Back River Joint Venture, consisting of Homestake Mining Company, Kerr-McGee Corporation and the MacLab Group.

In the Reagan Lake supracrustal belt, BHP-Utah Mines Ltd. completed geological mapping and ground VLF-EM and magnetometer geophysical surveys over parts of the RAJAH and PRIMERO claims (14). In the same area, Cogema Canada Ltd. conducted a mapping and sampling program on the GAET claim group (15).

In the Esker Lake area, Equity Silver Mines Limited conducted exploration on the MUSKOX-WASP-UP claim group (16), under terms of a joint venture agreement with Argus Resources Ltd. and Sirius Energy Corporation Ltd.

Hood River Belt

On the HOOD claims (17), south of Takijug Lake, in the Hood River volcanic belt, Falconbridge Limited resampled core from its Hood River #10 volcanogenic copper-zinc-silver deposit and conducted lithogeochemical sampling on the property.

Contwoyto - Itchen - Point Lakes Area

Exploration in this area was for iron-formation hosted gold deposits (Lupin type). Joint-venture partners, Cominco Ltd., the operator, and Cogema Canada Ltd., explored the COCO claims (18) by mapping, prospecting and conducting 100 line km of magnetometer and HL-EM geophysical surveys. Fifteen holes totalling 1 200 m were drilled. Thin intersections of low-grade gold-bearing iron formation were encountered.

BHP-Utah Mines Ltd. explored showings of auriferous iron formation by drilling 150 m on the TROY claims and 365 m on the BRAD claims (19).

Echo Bay Mines Ltd. continued exploration on its producing Lupin gold mine property at Contwoyto Lake (e). Echo Bay contracted MPH Consulting Ltd. to complete a 450 line km HL-EM and magnetometer survey to define the iron formation targets. Mapping, sampling, prospecting and 5 000 m of diamond drilling in 60 holes were completed at a cost of \$1 million.

Cominco Ltd. explored the AUR-24 claims (20) for extensions of the Butterfly gold deposit, which is estimated at 100 000 t grading 17 g per t of gold. Seven drill holes totalling 1 200 m were completed. The claims are held under a joint-venture agreement with Cogema Canada Ltd. and Aber Resources Ltd.

On the REN claims (21), Cominco Ltd., the operator, and joint venture partner, Westview Resources Inc. drilled 18 holes totalling 2 396 m, to explore iron formations for gold. Six holes tested the Main zone and its northern strike extension; two holes were drilled on the Banner zone and 10 holes were drilled to test nine EM conductors. A new discovery, the Grizz showing, a silicate and sulphide iron formation target, was exposed across 34 m, channel sampled and tested with three drill holes. Intersections included 0.9 m grading 7.85 g per t of gold. Mapping, sampling, prospecting and 150 line km of HL-EM and magnetometer surveys were completed. Ex-

penditures were estimated at \$750,000. Western Resources announced that previous drilling in the Main zone indicates a potential for a 1.8 to 2.7 million t deposit in the 10 g per t of gold range, within near vertically dipping sedimentary hosted iron formation.

Lac de Gras Area

In the Exter Lake area, Norm's Manufacturing and Geoservices Ltd. was contracted to conduct soil sampling in the southern part of claim block A, B, C and T (22). A ground geophysical survey was to be conducted on the property during the winter of 1990-1991.

Southern Slave Structural Province

Russell Lake - Indin Lake Area

In the Russell Lake supracrustal belt, Aber Resources Ltd. drilled 680 m in four holes to probe gold-bearing iron formation targets on the BUGOW claims (23). To the northeast of the BUGOW claims, Asarco Exploration of Canada Ltd. mapped, sampled and prospected the YELLER claims (23).

Indian Mountain Lake Area

In the Indian Mountain Lake area, exploration was directed to base metal targets. On the AA and CC claims (27), Cominco Ltd. prospected and sampled soils for base metals in anomalous areas defined by a 1964 ground magnetometer and HL-EM geophysical survey.

Ergo Resources Ltd. and Asquith Resources Inc. completed a 3 300 m drill program in February 1990 to test the Indian Mountain Lake BB zone (27) volcanogenic massive sulphide zinc-lead-silver deposit. Drill intersections extended the south limb of the deposit and intersected copper-rich stringer sulphide alteration some 460 km west of the Kennedy Lake copper-zinc-lead-silver deposits. In August 1990, 19 holes totalling approximately 3 700 m were completed. Previously, reserves of the BB zone and Kennedy Lake deposits combined to the 350 m level were estimated at 1.4 million t grading 10 per cent combined zinc and lead, 137 to 171 g per t of silver and 0.7 g per t of gold. New reserves based on the 1990 drill program were being calculated.

Yellowknife Supracrustal Basin

Cameron-Beaulieu Rivers Belt

Exploration in the Cameron-Beaulieu rivers volcanic belt was directed to both polymetallic volcanogenic sulphide targets and gold targets.

Placer Dome Inc. completed mapping, lithogeochemical sampling and magnetometer, VLF-EM and IP geophysical surveys on the KA and PAM claims (28), which were optioned from W. Kizam. Exploration was directed at potential shear-zone hosted gold deposits.

BHP-Utah Mines Ltd. mapped and prospected on its TOP claim (28).

Noranda Exploration Co. Ltd. worked in the area of the Sunrise base-metals project (29) and drilled 5 000 m to test targets located up to 10 km south of the Sunrise property. The Sunrise deposit, owned by the joint venture of Aber Resources Ltd. and Hemisphere Development Corp. hosts 1.87 million t grading 8.9 per cent zinc, 4.22 per cent lead, 405 g per t of silver and 0.96 g per t of gold. In August 1990, Noranda terminated its option on the Sunrise property.

In the Turnback Lake area, Nanisivik Mines Ltd. drilled 3 000 m to explore the KIL, RHY, CJ and JAK claims (30), under an option from Aber Resources Ltd. and Kelmet Resources Ltd. The target was potential polymetallic sulphide deposits. The 20 drill targets tested were defined by airborne and ground EM geophysical anomalies outlined in 1989.

Pamorex Minerals Inc. drilled 14 holes totalling 887 m to explore for gold on the AP and RGE claims (31), which form part of the Myrt Lake property.

Yellowknife Turbidite Basin

Exploration in this basin was for turbidite-hosted auriferous quartz veins, with the exception of the Nicholas Lake property, where gold deposits are hosted in granodiorite.

In the Gordon Lake area, Cameron Mining Ltd. and New Era Developments Ltd. mined a 1 900 t bulk sample from the DAF(MQ) deposit (32) and a 1 000 t bulk sample from the GOO and CATHY claims (32) on Burnt Island. The latter sample was taken from a decline that

was driven to the 155 m level. During the summer of 1990, 2 000 t of the bulk sample stockpile from the GOO and CATHY claim comprising material mined in 1989 and 1990 were hand-picked, and 1 700 t were processed through a 25 tpd mill brought to the site during the winter of 1989-1990. The bulk sample taken from the DAF deposit is to be processed in 1991.

Roxwell Gold Mines Ltd. drilled nine holes to confirm grade and continuity of the main vein of the TRYME claims (32). Acquired from Cominco Ltd., the property has an estimated 87 100 t grading 9.26 g per t of gold.

Athabaska Gold Resources Ltd. and Chevron Minerals Ltd. drilled two deep holes and two shallow holes totalling 1 863 m on the NIC claims (33) (Nicholas Lake property). The two deep holes intersected extensions of the A-7 and A-6 veins, confirming the downward projection of the Main showing. One of the holes intersected 3.9 m grading 5.4 g per t of gold and a second hole intersected 1.1 m grading 76.4 g per t of gold. The Nicholas Lake deposit has reserves, presently outlined by 69 drill intersections, amounting to 557 000 t grading 12.3 g per t of gold.

Tremingo Resources Ltd. continued to explore its TOM and PTARMIGAN properties (a,34) by drilling approximately 2 440 m. Ore intersections on the C vein will be explored from underground by drifting from the Tom mine.

Yellowknife Volcanic Belt

Exploration in the Yellowknife volcanic belt was directed entirely at gold targets.

In December 1989, Can-Mac Exploration Ltd. completed mining a 2 300 t bulk sample, estimated to grade 18.4 g per t of gold, from the MON property (35). The bulk sample was shipped to the Ptarmigan mill for processing. Three holes totalling 100 m were also drilled from underground.

In the Walsh Lake area, W. Humphries prospected and mapped the SAM and EAGLE claims (36).

Kelmet Resources Ltd. continued exploration on the volcanic-sediment contact on the TING, WAL, EQUINOX, KELLY, DUCK, TORO and CADEN claims (36) by prospecting and sampling.

Nathan Minerals Inc. explored the volcanic-sediment contact on the PRO and ANN claims (36) by drilling seven holes.

Giant Yellowknife Mines Ltd. completed four deep exploration holes from surface on its GIANT mine property (a, 37). Although the shear zone targets were intersected, gold values were low.

NERCO Inc. aggressively explored its NERCO Con mine leases (a, 37). Surface work included extensive mapping and geochemical sampling and drilling 3 500 m at Rat Lake and 2 000 m at Crank Lake to test the Con shear. Following an extensive IP survey south of the Robertson shaft, 600 m were drilled at Negus Point to test the Campbell shear and 1 000 m were drilled at Fault Lake to test the extension of the Campbell shear. The C16 and C20 shears were explored by trenching and channel sampling, mapping and both magnetometer and VLF-EM geophysical surveys. Exploration expenditures were estimated at over \$800 000. The underground exploration program is also described in this report under the caption "NERCO Con Mine Ltd., Con-Mine".

Golden Marlin Resources and joint-venture partner Cameco conducted an IP survey and drilled 11 holes totalling 1 300 m to explore for shear-hosted gold deposits on the MARLIN claims (37) covering Yellowknife Bay, Great Slave Lake. The best drill intersection returned a range of conflicting assay values over a width of one m.

Bear Structural Province

Cominco Ltd. prospected and mapped parts of Prospecting Permits 1244 to 1250 in the Bear Province, near the boundary of the Slave Structural Province.

Great Slave Plain and Cordillera

The Great Slave Plain is that part of the Interior Plain, which lies between latitudes 60° and 64° north and between the Franklin Mountains and the western edge of the Precambrian shield. It is underlain mainly by Paleozoic sedimentary rocks. The Horn Plateau consists of Mesozoic strata.

BP Canada Ltd. drilled several holes near the Horn Plateau (39) in the Great Slave Plain area, west of

Yellowknife. The company also explored prospecting permits in the Greasy Lake area (38).

Cominco Ltd. conducted geophysical surveys on claims near Racoon Lake (39) and Mink Lake (40) and Chedabucto Lake (41).

In the Cordillera, Procan Exploration Co. Ltd. conducted geochemical sampling on the RICO and PC claims (42) for polymetallic base-metals deposits.

Southeast MacKenzie District

East of Great Slave Lake, in the Taltson Arc, Kelmet-Resources Ltd. and Prairie Cache Resources Ltd. prospected on the EIGHT, ONE THREE MINE and PROSPERITY claims (43), in the Thubun Lakes area. The companies also mapped copper-zinc-silver-gold showings.

BHP-Utah Mines Ltd. mapped and sampled copper-nickel-gold-platinum group element showings on the LEA claims (44), Rutledge Lake area, that were optioned from Enxco International Ltd.

District of Keewatin

Exploration in Keewatin was directed to gold and base metals in the Rankin-Ennadai volcanic belt and to uranium and gold in the Baker Lake area.

Asamera Minerals Inc., in a joint venture with Comaplex Resources International Ltd., carried out detailed mapping, channel sampling and VLF-EM surveys on the NAT claims (45), located northeast of Rankin Inlet in the Meliadine River area. An east-west striking mineralized zone, 230 m long and open at both ends, was channel sampled. The best sample yielded 20.6 g per t of gold over 8.2 m. Fourteen holes, totalling 1 100 m were drilled in altered iron formation and mineralization was encountered in 11 holes. The best intersection was 12.4 g per t of gold over 12.1 m.

BHP-Utah Mines Ltd. completed 3 050 m of drilling on its Carr Lake claims (46) and on ground east of Maguse Lake (47).

Comaplex Resources International Ltd. prospected, mapped and sampled for gold on Prospecting Permits 1 233 to 1 237 and 1 251 in the Cullaton Lake area (48).

Comaplex Resources International, on behalf of Lucky Eagle Mines, Hecla Mining Company of Canada Ltd. and Agnico Eagle Mines Ltd., worked property held by Comaplex Resources International and Asamera Minerals Inc. The work consisted of VLF-EM and magnetometer surveys, geological mapping and 2 600 m of drilling in 27 holes on the Meadowbank River claims (49) and prospecting on nearby Prospecting Permits 1206 to 1209. The principal target was gold associated with sulphide-bearing iron formation and associated shears.

INCO Exploration and Technical Services Inc. conducted regional geological mapping, HL-EM, IP and magnetometer surveys on the IGLOO claims (50), in the Dawson Inlet area.

On behalf of Lucky Eagle Mines, a joint venture of Agnico Eagle Ltd. and Hecla Mining Company of Canada Ltd., W.A. Hubacheck Consultants Ltd. conducted EM, VLF-EM and magnetometer surveys on gold and possible base metals targets on Prospecting Permits 1170 and 1171 in the Kasba Lake — Ennadai Lake area (51).

Norstrad Exploration Inc. and Acadia Mineral Ventures Ltd. prospected and sampled the newly staked KING claims (52) in the Padlei area.

Suncor Inc. prospected and mapped Prospecting Permits 1229 to 1232 (48).

West of Baker Lake, Urangesellschaft (Canada) Ltd. in joint venture with PNC Exploration (Canada) Ltd. drilled a total of 6 700 m on a lease and claim block in the Judge Sissons Lake — Schultz Lake area (53) and carried out a prospecting program on adjacent Prospecting Permits 1161 to 1163. Surface VLF-EM, magnetometer, resistivity and gravity geophysical surveys were performed in selected areas.

Arctic Islands

Nanisivik Mines Ltd. explored the Nanisivik mine area (c) with a drill program and VLF-EM surveys.

In the central Arctic, Cominco Ltd. conducted UT-EM surveys and several thousand metres of drilling on the Truro Island and Eclipse zinc-lead deposits (55), on northeastern Cornwallis Island. Cominco Ltd. also staked claims on northern Cornwallis Island (56).

Noranda Mines Ltd. staked a large number of claims on north-central Victoria Island (57) to cover widespread copper occurrences in red-bed type showings. The occurrences were found in flat-lying Proterozoic quartzite.

Aber Resources Ltd. and Nanisivik Mines Ltd. plan to conduct an exploration program in the area during 1991 under terms of a joint venture agreement with Noranda. The 1991 program will include an airborne geophysical survey, a ground geophysical follow-up and drilling.

Table 8:
Placer Mining, Mines and Mining Exploration Properties, Yukon Territory, 1990

Location	N.T.S.	Property/CLAIM(S)	Company/Area
1	115 O	Indian River	Placer mining area
2	115N, O	Klondike	Placer mining area
	116 B, C	Klondike	Placer mining area
3	116 B, C	Sixty Mile, Forty Mile Rivers	Placer mining area
4	115 N, O	Lower Stewart River	Placer mining area
5	105 M	Mayo	Placer mining area
6	115 P	Clear Creek	Placer mining area
7	115 I	Dawson Range	Placer mining area
8	105 E	Livingston Creek	Placer mining area
9	105 A	MT. HUNDERE	Curragh Resources Inc., Hillsborough Resources Inc.
10	105 M	United Keno Hill	Bharti Laamanen Mining Company Ltd.
11	105 O	TOM	Cominco Ltd., Hudson Bay Exploration and Development
12	105 O	NIDD	Cominco Ltd.
13	105 O	JASON	Phelps Dodge Corporation of Canada
14	106 D	MARG	NDU Resources Inc., Cameco
15	106 D	BLENDE	Billiton Metals Canada Inc., NDU Resources Inc.
16	95 D	MEL	Barytex Resources Corp.
17	105 B	DAN	First Yukon Silver Resources
18	116 C	MICKEY	Archer Cathro & Associates (1981) Ltd.
19	105 L	DROMEDARY MT.	Dromedary Exploration Co. Ltd.
20	105 F	KETZA	Yukon Minerals Corporation
21	115 I	WILLIAMS CREEK	Thermal Exploration, Teck Corporation
22	105 D	GRAFTER	Aurora Gold
23	105 G	FYRE LAKE	Placer Dome Inc.
24	116 B	BREWERY CREEK	Loki Gold Corporation, Noranda Exploration Company Ltd.
25	115 O	LONESTAR	Arbor Resources Inc.
26	105 D	GODDELL	Skukum Gold Inc., Berglynn Resources Inc.
27	115 I	CARIBOU CREEK	Doron Explorations Inc.
28	115 I	GOULTER	Aurchem Exploration
29	105 C	TOG	Dunvegan Exploration Ltd.
30	105 D	PEERLESS	Feather Gold Resources Ltd.
31	105 O	ITSI, PUTZ-BENNETT	Noranda Exploration Company Ltd.
32	95 D	HYLAND GOLD	NDU Resources Inc. et al
33	115 N	CONNAUGHT	Tombstone Explorations Ltd.
a	105 F	Ketza River Mine	Camamax Resources Corp.
b	105 K	Faro and Vangorda Mines	Curragh Resources Inc.
c	105 M	KENO, LUCKY QUEEN	Archer, Cathro & Associates (1981) Ltd.
d	105 H	KING ARCTIC	Max Rosequist

Table 9:
Mines and Mining Exploration Properties, Northwest Territories, 1990

Location	N.T.S.	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company
1	77 A	CAPE, DOK, LARK	Noranda Exploration Company Ltd.
2	76O	KAMIK	BHP-Utah Mines Ltd.
3	76 M	TAM, TELLY, JOY, ANIALIK	Continental Pacific Resources Ltd.
4	76 M	CHAR	Continental Pacific Resources Ltd.
5	76 M	PP. 1181, ARNICA	BHP-Utah Mines Ltd.
6	76L	ULU, PULSE, DEN, FIDO	BHP-Utah Mines Ltd.
7	76 M	BAMAKO, PARIS	BHP-Utah Mines Ltd.
8	76 L	HOTEI	BHP-Utah Mines Ltd.
9	76 M	ROMA	BHP-Utah Mines Ltd.
9	76 M	HIGH LAKE	Kennco Explorations (Canada) Ltd.
9	76 M	MONA, CHARLIE	Continental Pacific Resources Ltd.
9	76 M	KLC	Cominco Ltd.
10	76 M	CYGNET	BHP-Utah Mines Ltd.
11	76 G	BRAU	George Lake Joint Venture
11	76 G	RAP, WR, IPG, SEL, LOW	Echo Bay Mines Ltd.
12	76 G	BRAU	Back River Joint Venture
13	76 G	BRAU	Back River Joint Venture
14	76 G	RAJAH, PRIMERO	BHP-Utah Mines Ltd.
15	76 G	GAET	Cogema Canada Ltd.
16	76 F	MUSKOX, WASP, UP	Equity Silver Mines Ltd.
17	86 I	HOOD	Falconbridge Limited
18	76 E	COCO	Cominco Ltd., Cogema Canada Ltd.
19	76 E	TROY, BRAD	BHP-Utah Mines Ltd.
20	76 E	AUR 24	Cominco Ltd.
21	86 H	REN	Cominco Ltd., Westview Resources Inc.
22	76 D	A, B, C, T	Norm's Manufacturing and Geoservices Ltd.
23	85 O	BUGOW	Aber Resources Ltd.
23	85 D	YELLER	Fortune Minerals Limited, Asarco Exploration of Canada Ltd.
24	86 B	MESA	Noranda Exploration Co. Ltd.
25	86 B	KIM	Echo Bay Mines Ltd.
25	86 B	NAM 3	Stratabound Minerals Corp.
26	86 B	BAJ, ED, CDC	Northwest Gold Corp.
27	76 M	AA, CC	Cominco Ltd.
27	76 M	BB	Ergo Resources Ltd., Asquith Resources Inc.
28	85 P	KA, PAM	Placer Dome Inc.
28	85 P	TOP	BHP-Utah Mines Ltd.
29	85 I	SUNRISE	Noranda Exploration Co. Ltd.
30	85 I	KIL, RHY, CJ, JAK	Nanisivik Mines Ltd.
31	85 I	AP, RGE	Pamorex Minerals Inc.
32	85 I, P	DAF, GOO, CATHY	Cameron Mining Ltd., New Era Development Ltd.
32	85 P	TRY ME	Roxwell Gold Mines Ltd., Chevron Minerals Ltd.
33	85 P	NIC	Athabaska Gold Resources Ltd., Chevron Minerals Ltd.

Table 9: (Continued)
Mines and Mining Exploration Properties, Northwest Territories, 1990

Location	N.T.S.	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company
34	85 J	TOM, PTARMIGAN (Mine)	Treminco Resources Ltd.
35	85 J	MON	Can-Mac Exploration Ltd.
36	85 J	TING, WAL, EQUINOX, KELLY, DUCK, TORO, CADEN	Kelmet Resources Ltd.
36	85 J	PRO, ANN	Nathan Minerals Inc.
37	85 J	GIANT (mine)	Giant Yellowknife Mines Ltd.
37	85 J	CON (mine)	NERCO Con Mine Ltd.
37	85 J	MARLIN	Golden Marlin Resources Ltd.
38	95 J	Greasy Lake Area	BP Canada Ltd.
39	85 K, L	Horn Plateau Area	BP Canada Ltd.
39	85 K	Racoon Lake Area	Cominco Ltd.
40	85 F	Mink Lake Area	Cominco Ltd.
41	85 J	Chedabucto Lake Area	Cominco Ltd.
42	95 F	RICO, PC	Procan Exploration Co. Ltd.
43	75 E	EIGHT, ONE THREE MINE	Kelmet Resources Ltd., Prairie Cache Resources Ltd.
44	75 E	LEA	BHP-Utah Mines Ltd.
45	55 J, K,	NAT N,O	Asamera Minerals Inc., Comaplex Resources International Ltd.
46	55 L	Carr Lake Area	BHP-Utah Mines Ltd.
47	55 E	Maguse Lake Area	BHP-Utah Mines Ltd.
48	65 G, H	P.P. 1233-1237, 1251	Comaplex Resources International Ltd.
48	65 G	P.P. 1229-1232	Suncor Inc.
49	66 H	Meadowbank R. Area	Comaplex Resources International Ltd.
50	55 F	IGLOO	INCO Exploration and Technical Services Inc.
51	65 C	WADE, P.P. 1170, 1171	Lucky Eagle Mines
52	65 H	KING	Norstrad Exploration Inc., Acadia Mineral Ventures Ltd.
53	66 A, B	P.P. 1161-1163	Urangesellschaft (Canada) Ltd., PNC Exploration (Canada) Co. Ltd.
54	66 A	Kiggavik property	Urangesellschaft (Canada) Ltd., CEGB Exploration (Canada) Ltd.
55	68 H	Northeast Little Cornwallis Island	Cominco Ltd.
56	58 G	Northern Cornwallis Island	Cominco Ltd.
57	78 B	North-Central Victoria Island	Noranda Mines Ltd.
a	85 J	Giant Mine	Giant Yellowknife Mines Ltd.
a	85 J	Con Mine	NERCO Con Mine Ltd.
a	85 J	Ptarmigan and Tom Mines	Treminco Resources Ltd.
b	68 H	Polaris Mine	Cominco Ltd.
c	48 C	Nanisivik Mine	Nanisivik Mines Ltd.
d	86 B	Colomac Mine	Northwest Gold Corp.
e	76 E	Lupin Mine	Echo Bay Mines Ltd.
f	85 B	Pine Point Mine	Cominco Ltd.

GLOSSARY OF TERMS

ECONOMIC FINANCIAL TERMS

Abandonment Security: A security provided by a mining company to the responsible level of government. In the event of an unplanned closure there would be funds available to restore the site in an environmentally sound manner.

Cash Flow: The difference between an operation or company's cash inflows and cash outflows for a specified time period. Specifically, income less expenditures plus depreciation and deferred income tax.

Constant Money Value: Constant money units have a constant purchasing power, measured by the goods and services they will buy and are defined with respect to the purchasing power of a currency at a particular point in time, normally the present.

Current Money Value: Current money units reflect the money value existing at a particular point in time based on its actual or estimated purchasing power.

Depreciation Allowance: A tax deduction allowed to a company to deduct or to write off the capital costs of its fixed asset.

Mineral Economics: Is the application economics to the study of all aspects of the mineral sector.

Net Present Value: The present value of the sum of all anticipated future positive cash flows from a project that have been discounted using the cost of capital as the discount rate.

Operating Costs: There are many measures of operating costs including, cash costs, cash plus capital costs and cash, capital, and interest costs. It is important to always determine which costs are being included in the operating costs under discussion.

Payback Period: The number of years required to recover an investment from the positive cash flows of an operation measured from the start of production.

Rate of Inflation: The relationship between constant and current money which measures the rate at which the purchasing power of a currency decreases with time.

Rate of Return: This is a measure of the average annual percentage return on investment that an operation is expected to yield over the total project life. The rate of return must be greater than the cost of capital in order to avoid economic loss.

Sunk Cost: These are the costs that have already been incurred by a project. A sunk cost cannot be altered and therefore is irrelevant for decision-making purposes.

Working Capital: This refers to the funds available to a company for carrying on the activities of business after an allowance for bills that have to be paid within the year.

GEOPHYSICAL TERMS

Conductive Anomaly: A ground area which exhibits higher than average conductance and may indicate the presence of a metallic mineral deposit or other conductive minerals such as graphite.

Geochemical Anomaly: An area where higher than expected levels of metals are indicated as the result of chemical analysis from soil or rock samples.

HL-EM Survey: A Horizontal Loop Electromagnetic Survey uses two loops, one a transmitter and the other a receiver, at a fixed distance apart. A primary field is generated and distortion by the induced electro-magnetic field is measured to determine the presence of mineralization.

IP Survey: An Induced polarization survey, either electrical or magnetic, involves the application of an electrical or magnetic field to the earth's surface then the decay characteristics of the induced field are measured and interpreted to determine the presence of a mineralized deposit.

Lithogeochemical Sample: Refers to any sample of the lithosphere (rocks, soils and sediments). Generally such samples are collected and analyzed as part of a mineral exploration program.

Magnetometer Survey: A survey to measure the minute changes in the earth's magnetic field. The results of the survey can show areas of potential mineralization that could be further explored by diamond drilling.

Resistivity Survey: A survey to measure the electrical resistance characteristics of the earth's crust to an applied electrical current over a given area. Mineralized areas can be identified for further exploration.

VLF-EM Survey: A Very Low Frequency Electromagnetic survey uses a 10kHz to 30 kHz electromagnetic signal with wavelengths of 10 to 30 km as its primary field. An EM survey will give some indication of the depth of a conductive body below surface.

OPERATIONAL TERMS:

Drift: A horizontal passage or working area underground. A drift is commonly driven to follow the mineralization being mined.

Mineral Claim: A area of land, often rectangular in shape, with identified boundaries. Mineral claims once staked are registered with a government authority. Requirements to maintain ownership are determined by the provincial or federal government.

Mineral Reserves: A quantitative measurement of minerals in place, usually reported in tonnes of metal content. There are many different types of mineral reserves such as probable, possible and inferred depending on the level of known information. It is most important to define what kind of reserves have been identified.

Placer Mining: The extraction of heavy metals such as gold from unconsolidated sands and gravels using flowing water and mechanical equipment such as sluice boxes or dredges. Placer operations range from single miners panning on a river bank to large operations with many miners and sophisticated equipment.

Ramp: An inclined access way for the movement of miners, equipment and materials into and out of an underground mine. The portal is the opening where the ramp meets the surface. Internal ramps connect one or more working levels within a mine.

Tailing Retreatment: Earlier metallurgical processes often left appreciable amounts of unrecovered metals or minerals in the tailings. Technological advances have allowed for these tailing to be retreated and economic amounts of metals and minerals to be recovered.

Water Licence: A permit that is issued to an individual or business whose activity may have some impact on the quality and quantity of water in the operating area. Such licences are issued by the Water Boards operating under the Northern Inland Waters Act in the northern territories.

MINERALOGICAL and PETROLOGICAL TERMS:

Azurite: Copper Carbonate $\text{Cu}_3(\text{CO}_3)_2(\text{OH})_2$. Like malachite it is a secondary copper mineral found in the oxidized zone of copper deposits. It is a distinct blue colour.

Barite: Barium Sulphate BaSO_4 . It often occurs as a vein filling or a gangue material with base-metal ores. It is the principal source of barium. Barite is often used in drilling mud and as a filler for paper and textiles.

Chalcopyrite: Copper-Iron Sulphide $(\text{CuFe})\text{S}_2$. The most important ore mineral of copper, often found in hydrothermal veins associated with galena and sphalerite. Chalcopyrite is also called "fool's gold" because of its golden colour.

Dolomite: Calcium-Magnesium Carbonate $\text{CaMg}(\text{CO}_3)_2$. Dolomite occurs widely as a rock forming mineral. It occurs as a gangue mineral in hydrothermal veins particularly those with galena and sphalerite. The mineral dolomite is often used in the manufacture of refractory bricks.

Galena: Lead Sulphide PbS . A common ore mineral of lead, typically found in medium-temperature hydrothermal deposits.

Granodiorite: A coarse-grained igneous rock composed mainly of quartz, potassium feldspar and plagioclase. It is the most common rock of the granite family.

Limonite: Hydrated Iron Oxide $\text{FeO}(\text{OH})$. Limonite is produced by the oxidation of iron sulphide minerals. It is very soft and is used as a yellow pigment.

Malachite: Copper Carbonate $\text{Cu}_2\text{CO}_3(\text{OH})_2$. A secondary copper mineral commonly found in the oxidized zone of copper deposits. It is a distinct green colour.

Nephrite: Calcium-Magnesium Silicate $\text{Ca}_2(\text{Mg,Fe})_5\text{Si}_8\text{O}_{22}(\text{OH})_2$. Nephrite is one of two minerals referred to as jade, it is very tough and is often used in carvings and jewellery.

Placer Gold: An impure form of metallic gold recovered from gold bearing sands and gravels. Often, placer gold is only 80 per cent pure, the remainder is often silver or copper.

Phyllite: A rock produced by low-grade metamorphism of shale or slate. It is usually grey or green in colour with a characteristic silvery sheen.

Pyrrhotite: Iron Sulphide FeS . A variation of pyrite in which some of the iron has been replaced by other metals. It is sometimes magnetic and can be an important source of nickel when it is the replacement metal.

Quartzite: A rock produced from metamorphosed quartz sandstones. It is usually medium grained and light-coloured white grey or reddish.

Quartz Monzonite: An igneous rock containing equal amounts of plagioclase and alkali feldspar.

Pyrite: Iron Sulphide FeS_2 . One of the most common and widely distributed sulphide minerals. It occurs in many different geological environments.

Sphalerite: Zinc-Iron Sulphide $(\text{Zn,Fe})\text{S}$. The main ore mineral of zinc, found in hydrothermal veins often associated with galena.

Tetrahedrite: Copper-Iron-Antimony-Arsenic Sulphide $(\text{Cu,Fe})_{12}(\text{Sb,As})_4\text{S}_{12}$. Tetrahedrite is often found in hydrothermal veins associated with silver, copper, lead and zinc minerals.

GEOLOGICAL TERMS

Cretaceous Period: The interval of geologic time which began about 136 million years before the present and lasted about 71 million years.

Dike: A tabular body of of intrusive igneous rock which cuts across the layering or structural fabric of the host rock. Dikes can vary both in thickness and in length from less than a metre to over a kilometre.

Dip: The angle in degrees between the horizontal and the inclined plane of a vein or rock strata measured perpendicular to the horizontal direction of the plane.

Fault Zone: A fault evidenced by a zone consisting of a network of many small faults forming a strip that can sometimes be several hundred meters wide.

Intrusion: A forceful injection of molten rock into a pre-existing rock. The intrusion can cut across the pre-existing structure or follow along some structural channel such as a bedding plane.

Mesozoic Era: This era follows the Paleozoic and lasted 155 million years from 220 to 65 million years before the present.

Paleozoic Era: This era lasted the 350 million years immediately following the Precambrian era which accounts for the first 3.9 billion years of time.

Proterozoic Period: This includes the later part of the Precambrian Era.

Shear Zone: An area where the rock has been crushed into small pieces due to the cumulative small lateral movements along many parallel planes.

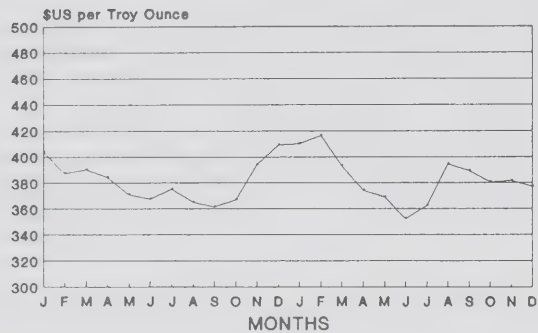
Strike: The trace of a dipping plane such as a fault, a bedded rock or a vein as it intersects the horizontal plane.

Vein: A tabular or sheetlike body of one or more minerals deposited in open fissures, joints or faults.

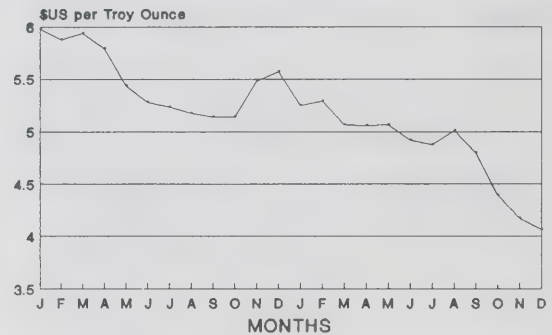
Figure 1.

LONDON METAL EXCHANGE PRICES

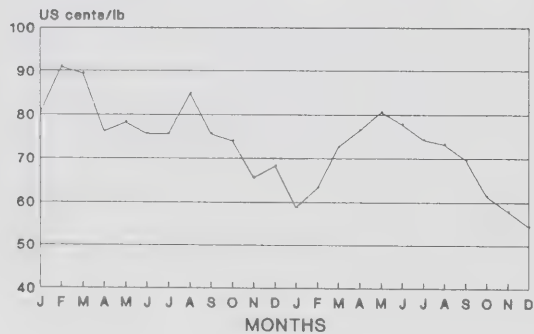
GOLD PRICES 1989-90
LME MONTHLY AVERAGE



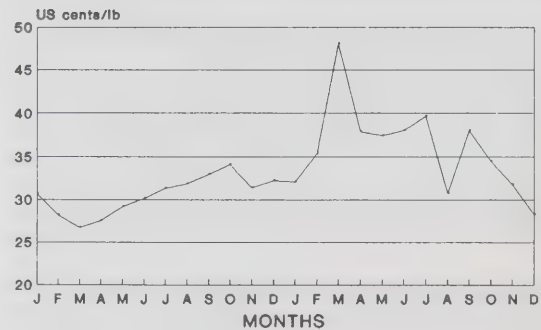
SILVER PRICES 1989-90
LME MONTHLY AVERAGES



ZINC PRICES 1989-90
LME MONTHLY AVERAGES



LEAD PRICES 1989-90
LME MONTHLY AVERAGES



**TABLE 10:
Mineral Production, Yukon,
1981-1990**

Mineral	1981	1982	1983	1984	1985	1986	1987	1988	1989(R)	1990(P)
Gold	% 66 382 000 kg 3 746	39 721 000 2 656	50 337 000 3 006	44 419 000 2 960	42 669 000 3 065	58 237 000 3 547	88 970 000 4 674	87 386 000 5 052	80 070 000 5 652	66 342 000 4 602
Silver	\$ kg 32 339 000 80 000	29 943 000 95 000	6 891 000 15 000	18 825 000 54 000	13 098 000 47 000	18 468 000 73 000	40 965 000 133 000	42 593 000 159 000	14 851 000 71 000	15 427 000 84 000
Lead	\$ kg 54 935 000 55 970 000	25 733 000 35 493 000	307 000 520 000	1 539 000 2 083 000	848 000 1 470 000	23 893 000 35 091 000	105 982 000 100 267 000	118 696 000 117 058 000	98 310 000 94 529 000	127 468 000 106 489 000
Copper	\$ kg 20 123 000 9 094 000	14 654 000 7 510 000	3 977 000 1 904 000		19 000 10 000	13 000 6 000	22 000 9 000			
Zinc	\$ kg 94 237 000 78 806 000	58 519 000 54 537 000	31 000 27 000	244 000 173 000	137 000 109 000	61 521 000 50 634 000	187 336 000 147 045 000	237 932 000 143 939 000	332 934 000 154 709 000	327 836 000 170 128 000
Antimony	\$ kg								11 000 4 000	5 000 2 000
Bismuth	\$ kg			2 000 162	11 000 1 000	5 000 541	2 000	2 000	12 000 1 000	13 000 2 000
Cadmium	\$ kg		6 000 2 000	9 000 2 000	5 000 1 000	8 000 2 000	13 000 2 000	62 000 3 000	8 000 1 000	
Sand and Gravel	\$ t	550 000 463 000	1 438 000 480 000	5 105 000 3 074 000	2 995 000 1 185 000	13 355 000 4 902 000	1 502 000 352 000	5 184 000 2 246 000	5 675 000 2 367 000	4 015 000 1 763 000
Sulphur (smelter gas)	\$ t				267 000 2 000	1 000 7	156 000 1 000	183 000 2 000	39 000 N/A	28 000 N/A
Coal (E)	\$ t	368 000 20 860				209 000 17 223	440 000 20 000	100 000 10 000	420 000 40 000	
Stone	\$ t						679 000 206 000			
TOTAL	\$	268 016 000	169 120 000	62 987 000	70 143 000	60 069 000	176 310 000	426 027 000	532 330 000	541 134 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.

(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential, (N/A) Not available

**TABLE 11:
Mineral Production, Northwest Territories,
1981-1990**

Mineral		1981	1982	1983	1984	1985	1986	1987	1988	1989(R)	1990(P)
Gold	\$	85 495 000	91 415 000	144 570 000	191 071 000	177 079 000	205 266 000	223 456 000	205 503 000	177 260 000	217 131 000
	kg	4 825	6 113	8 634	12 732	12 713	12 503	11 740	11 880	12 208	15 063
Silver	\$	13 456 000	16 073 000	33 743 000	20 361 000	9 083 000	5 478 000	4 006 000	6 923 000	3 820 000	5 344 000
	kg	33 000	51 000	74 000	59 000	33 000	22 000	13 000	26 000	18 000	29 000
Copper	\$	613 000	419 000	214 000	130 000	46 000	1 000	4 000	3 000		
	kg	277 000	215 000	102 000	69 000	23 000	1 000	2 000	1 000		
Lead	\$	44 680 000	46 367 000	47 981 000	66 647 000	44 489 000	91 129 000	139 370 000	52 223 000	41 323 000	45 595 000
	kg	45 522 000	63 955 000	81 161 000	90 198 000	77 083 000	133 836 000	131 744 000	51 502 000	39 734 000	38 091 000
Zinc	\$	159 764 000	229 110 000	269 951 000	386 813 000	356 415 000	322 064 000	328 781 000	537 756 000	708 009 000	611 434 000
	kg	133 604 000	213 523 000	234 883 000	274 920 000	284 223 000	265 073 000	258 070 000	325 321 000	329 001 000	312 298 000
Cadmium	\$			10 000	1 034 000	866 000	670 000	501 000	3 172 000	4 405 000	2 392 000
	kg			3 000	214 000	238 000	175 000	86 000	166 000	269 000	273 000
Bismuth	\$			163 000	34 000	60 000					
	kg			32 000	3 000	3 000					
Antimony	\$							141 000	55 000	43 000	18 000
	kg							44 000	19 000	18 000	9 000
Tungsten Trioxide (E)	\$	43 363 000	38 353 000	11 221 000	33 584 000	38 918 000	17 363 000				
	kg	2 515 000	2 925 000	1 126 000	3 112 000	3 529 000	2 470 000				
Arsenious Trioxide (E)	\$	561 000	3 862 000	2 345 000	5 837 000	1 969 000	254 000	666 000	2 366 000	1 286 000	288 000
	t	1 094	1 780	982	4 684	4 098	406	X	X	X	X
Sulphur (smelter gas)	\$					11 665 000	21 788 000	6 912 000	7 286 000	8 468 000	6 053 000
	t				98 000	147 000	59 000	6 000	73 000	67 000	47 000
Sand and Gravel	\$		41 482 000	32 479 000	36 323 000	8 981 000	3 281 000	8 132 000	10 966 000	11 813 000	11 609 000
	t		6 625 000	5 905 000	7 249 000	6 803 000	986 000	2 183 000	2 443 000	2 203 000	2 164 000
Stone	\$		1 268 000	14 601 000	4 617 000	434 000	1 011 000	1 486 000	232 000	4 344 000	6 550 000
	t		323 000	2 409 000	729 000	163 000	368 000	472 000	108 000	727 000	1 022 000
TOTAL	\$	347 841 000	468 349 000	557 198 000	746 451 000	649 732 000	668 452 000	713 310 000	826 487 000	960 771 000	906 414 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.

(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential



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INTRODUCTION

This report covers the activities of the mines and minerals sector of Yukon and the Northwest Territories during the calendar year 1991.

The report was compiled by D.D.Brown of the Mining and Infrastructure Directorate of the Department of Indian Affairs and Northern Development (DIAND), Ottawa. Sections on mineral exploration are based on the 1991 mining exploration overviews produced by DIAND regional staff under the direction of S.R.Morison, Northern Affairs Program in Yukon Region and W.A. Padgham, Northern Affairs Program in the Northwest Territories Region.

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SUMMARY

Yukon

The value of minerals produced in Yukon was estimated at \$346 million in 1991 compared with \$542 million in 1990. Curragh Resources' Faro zinc-lead-silver operation was the largest producer. In August 1991, Curragh Resources Inc. and Hillsborough Resources Inc. started up the new Sa Dena Hes zinc-lead mine. The decline in Yukon's mineral production value during 1991 was caused by lower zinc and lead prices and reduced production at the Faro operation during a 10-week strike. Lead and zinc from the Faro and Sa Dena Hes hardrock operations accounted for 75 per cent of the total value of mineral production. The number of placer gold operations remained about the same in 1991 as in 1990, but production reported by royalty payments dropped by 19 per cent. The preliminary value of sold gold represents 19.4 per cent of the total value of mineral production. Although no hardrock gold mines were in production during 1991, Wheaton River Minerals Ltd. could bring its Skukum Creek gold property in the Wheaton River area into production in 1992. The property includes the Mount Skukum mine and mill, a recent gold producer.

At year end 1991, Curragh Resources was ready to begin a \$40 million preproduction stripping program on the Grum zinc-lead-silver deposit near Faro, but work was delayed pending the financing of the project. The development of the Grum deposit is essential for the continuance of Curragh's Faro mill operation during the 1990s.

In 1991, exploration expenditures in Yukon rose to \$16 million from about \$12 million a year earlier. Seven major companies accounted for three quarters of the expenditures. The exploration work was directed to zinc-lead-silver, gold and copper properties.

Northwest Territories

The value of minerals produced in the Northwest Territories was estimated at \$545 million in 1991 compared with \$730 million in 1990. The decline was due to lower metal prices. Mineral production was derived from five gold mines and two zinc-lead mines, with gold accounting for 40.5 per cent of the mineral production value and zinc-lead for 56.1 per cent.

Production of Northwest Gold Corp.'s Colomac gold mine was suspended in June 1991 pending an improvement in gold prices and financial restructuring. The

NERCO Con mine and Echo Bay's Lupin mine set gold production records in 1991. Cominco's Polaris mine and the Nanisivik mine, both in the Arctic, continued to perform well despite low metal prices.

In 1991, exploration expenditures in the Northwest Territories increased marginally over the \$36 million spent in 1990. Major mining companies were responsible for most of the exploration expenditures, and gold, base metals, uranium and diamonds were the principal targets. Claim staking continued at low levels through to October 1991. In November 1991, BHP-Utah Mines and Dia Met Minerals announced a diamond-bearing drill intersection in kimberlite on their property at Lac de Gras, in the Exeter Lake area, northeast of Yellowknife. The release of this information caused a staking rush, and intensive exploration activity for diamondiferous kimberlite is expected in the region in 1992.

SOMMAIRE

Yukon

La valeur des minéraux extraits au Yukon a été évaluée à 346 millions de dollars en 1991, comparativement à 542 millions de dollars en 1990. L'exploitation de zinc, de plomb et d'argent à la mine Faro de la Curragh Resources s'est classée au premier rang de la production. En août 1991, les sociétés Curragh Resources Inc. et Hillsborough Resources Inc. ont ouvert la nouvelle mine de zinc et de plomb de Sa Dena Hes. Le déclin de la valeur de la production minérale du Yukon en 1991 est attribuable à une baisse du prix du zinc et du plomb et une activité réduite à la mine Faro due à une grève de dix semaines. Le plomb et le zinc extraits des mines en roche dure à Faro et à Sa Dena Hes représentent 75 p. 100 de la valeur totale de la production minérale. Le nombre de placers a peu changé en 1991 par rapport à 1990, mais la production déclarée aux fins du paiement des redevances a baissé de 19 p. 100. La valeur préliminaire de l'or représente 19,4p.100 de la valeur totale de la production minière. Bien qu'aucune mine en roche dure n'ait été en activité en 1991, la Wheaton River Minerals Ltd pourrait commencer l'exploitation de sa propriété du Skukum Creek, dans la région de la Wheaton River, en 1992. Cette propriété comprend la mine du mont Skukum, nouvelle exploitation aurifère.

À la fin de 1991, la Curragh Resources était sur le point de mettre en oeuvre un programme d'enlèvement des morts-terrains, d'une valeur de 40 millions, dans son gisement de zinc, de plomb et d'argent de Grum, près de Faro, mais les travaux ont été reportés pour permettre le financement du projet. La mise en valeur du gisement de Grum est essentielle à l'exploitation continue de la mine de Faro de la Curragh dans les années 1990.

Au Yukon, les dépenses liées à la prospection s'ont passées de 12 millions de dollars en 1990 à 16 millions de dollars en 1991. Sept grandes sociétés se partagent les trois quarts des dépenses. Les travaux de prospection ont été orientés vers les propriétés de zinc, de plomb et d'argent, les propriétés d'or et le cuivre.

Territoires du Nord-Ouest

La valeur des minéraux extraits dans les Territoires du Nord-Ouest a atteint 545 millions de dollars en 1991, comparativement à 730 millions de dollars en 1990. La baisse du prix des métaux explique le fléchissement de la valeur en 1991. La production minérale provenait de cinq mines d'or et de deux mines de zinc et de plomb; la

production de l'or représentait 40,5 p. 100 de la valeur totale de la production minérale et celle de plomb et de zinc, 56,1 p. 100.

Les travaux de la mine d'or de Colomac de la Northwest Gold Corporation ont été interrompus en juin 1991, en prévision d'une majoration du prix de l'or et d'une restructuration financière.

La mine Con de la Nerco et la mine Lupin de l'Echo Bay ont atteint une production record en 1991. La mine Polaris de la Cominco et la mine Nanisivik, toutes deux situées dans l'Arctique, ont continué d'exceller malgré la baisse du prix des métaux.

En 1991, dans les Territoires du Nord-Ouest, les dépenses de prospection ont légèrement dépassé les 38 millions de dollars dépensés en 1990. La majorité des dépenses de prospection ont été engagées par les grandes sociétés minières, principalement pour la production de l'or, des métaux communs, de l'uranium et des diamants. Le jalonnement des concessions s'est poursuivi à petite échelle jusqu'au mois d'octobre 1991. En novembre 1991, la BHP-Utah Mines et la Dia Met Minerals ont annoncé un recoupement diamantifère dans la kimberlite de leur propriété au Lac de Gras, dans la région d'Exeter Lake, au nord-est de Yellowknife. Cette annonce a provoqué une ruée de jalonnement et des travaux importants de prospection de la kimberlite diamantifère sont prévus dans la région en 1992.

MINES AND MINERALS ACTIVITIES 1991

Yukon

Mineral Production

The value of mineral production in Yukon during 1991 was estimated at \$346.2 million compared with \$541.8 million the previous year. The lower production value in 1991 was caused principally by depressed zinc and lead prices during the year and lower concentrate production at Curragh Resources Inc.'s Faro operation. The operation was affected by a 10-week strike in the second quarter of 1991. Curragh Resources Inc. and Hillsborough Resources Ltd. began production at the new Sa Dena Hes zinc-lead mine on August 1, 1991. Production of concentrate during the remainder of the year contributed to Curragh's total output.

Gold production from Yukon's placer mine operations continued to be second in value only to zinc-lead output from the Faro and Sa Dena Hes operations. Placer gold production reported by royalty payments in 1991 declined by approximately 19 per cent from the previous year to reach 3482.7 kg of crude gold.

Among a number of prospective properties, Loki Gold Corporation and Hemlo Gold Mines Inc. continued extensive drilling on the Brewery Creek property, near Dawson, where shallow oxidized gold reserves show good recoveries for heap leach processing. Wheaton River Minerals Ltd. acquired the developed Skukum Creek gold deposit, south of Whitehorse and the nearby Mount Skukum mine. The company could begin production as early as September 1992. Western Copper Holdings and Thermal Exploration have defined a large tonnage of oxidized copper reserves, which could be mined by open pit and be processed by heap-leach and solvent extraction methods.

Yukon's hardrock mine operations, comprising Curragh Resources' Faro and Vangorda mines and its Sa Dena Hes mine, owned jointly with Hillsborough Resources, directly employed 510 mine workers at year end 1991. Yukon's 194 placer mining operations employed an estimated 700 people during the placer mining season.

Yukon accounted for 13.2 per cent of the zinc, 39.8 per cent of the lead and 2.8 per cent of the gold produced in Canada during 1991. Yukon's 1991 metallic mineral production value amounted to 3.25 per cent of the total value of Canada's 1991 metallic mineral production. This compares with 4.25 per cent in 1990.

Mines

Curragh Resources Inc., Faro and Vangorda Mines

Curragh Resources is the leading mine operator in Yukon. In 1991, the Faro mill (a) processed 4.1 million tonnes (t) of ore to yield 287 015 t of zinc concentrate and 155 765 t of lead concentrate. This compares with 359 444 t of zinc concentrate and 189 040 t of lead concentrate during the previous year. Lower concentrate production in 1991 compared with 1990 was attributed to a 10-week strike in the second quarter of 1991 and a small drop in mill feed grade. By the fourth quarter of 1991, approximately 50 per cent of the ore processed came from the Vangorda pit and 50 per cent from the Faro pit. In July and August 1991, heavy rainfall threatened the stability of the Faro pit wall and mine operations were temporarily suspended to ensure employee safety.

In 1991, soft metal prices and the high Canadian dollar squeezed the economics of the Faro operation severely. A cutback of almost 20 per cent of the work force took place.

In 1992, the Faro deposit will be depleted. However, the Vangorda pit is expected to produce 2.9 million t of ore to account for two thirds of the mill feed to the Faro concentrator. Over the next decade the Grum deposit, located between the Faro and Vangorda deposits, is expected to be the most important source of feed to the Faro mill. Preproduction stripping of the Grum deposit is required at a rate of 74 000 tonnes per day (tpd) for approximately 10 months to bring this new mine into production. At year end 1991, work was delayed pending the availability of full financing.

Type:	underground and open pit at Faro, open pit at Vangorda
Location:	14 km north of Faro and 7 km east-northeast of Faro
Product:	zinc, lead, silver, gold
Mill Capacity:	13 500 tpd
Tonnes Milled:	4.1 million t
Ore Reserves:	N/A
Ore Reserve Grade:	N/A
Employees:	422 (December 31, 1991)

N/A: Not available

* Numbers or letters in parenthesis indicate the location of the property on Map. 1

Table 1:
Mineral Production of Operating Mines, Yukon, 1989, 1990 and 1991

Company, Mine and Commodity	1989		1990		1991(P)	
	t	kg	t	kg	t	kg
Curragh Resources Inc. Faro and Vangorda mines						
zinc	176 832		151 910		135 442*	
lead	108 144		105 510		101 831*	
silver		95 428		86 343		N/A
Curragh Resources Inc. and Hillsborough Resources Ltd. Sa Dena Hes mine						
zinc					* Sa Dena Hes mine's zinc and lead production is included in figures for Faro and Vangorda mines above	
lead						

Source: Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

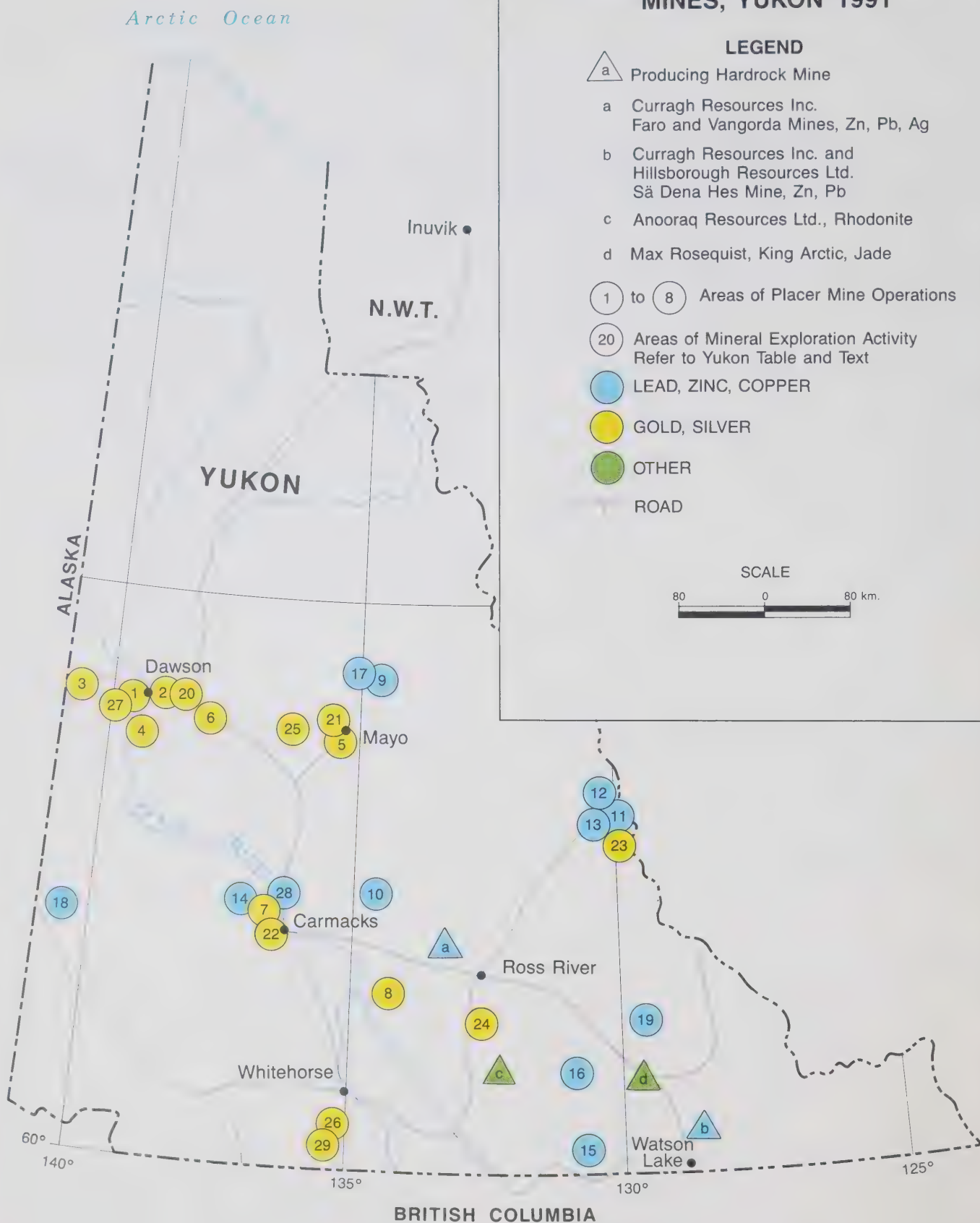
(P) = Preliminary N/A = Not Available

MAP 1 MINERAL EXPLORATION AND MINES, YUKON 1991

LEGEND

-  Producing Hardrock Mine
 - a Curragh Resources Inc.
Faro and Vangorda Mines, Zn, Pb, Ag
 - b Curragh Resources Inc. and
Hillsborough Resources Ltd.
Sà Dena Hes Mine, Zn, Pb
 - c Anooraq Resources Ltd., Rhodonite
 - d Max Rosequist, King Arctic, Jade
-  Areas of Placer Mine Operations
-  Areas of Mineral Exploration Activity
Refer to Yukon Table and Text
-  LEAD, ZINC, COPPER
-  GOLD, SILVER
-  OTHER
-  ROAD

SCALE



Curragh Resources Inc. and Hillsborough Resources Ltd., Sa Dena Hes Mine

Curragh Resources owns 80 per cent of the Sa Dena Hes zinc-lead mine (b) under a joint venture agreement with Hillsborough Resources Ltd., which owns 20 per cent. The \$70-million project near Watson Lake was brought on stream in July 1991, when underground production mining started. On August 1, 1991 the mill started up, and during the remainder of the year a total of 44 998 t of zinc and lead concentrate were produced from 172 345 t of ore with an average combined zinc-plus-lead head grade of 20.2 per cent. Initial milling capacity is 1 500 tpd, and at lower grades capacity can be increased to 2 500 tpd. The mine will produce 120 000 to 150 000 t of zinc and lead concentrate per year and has a projected life of nine years.

Curragh successfully initiated an agreement with the Kaska Dena Nation, that provides for training, employment and business opportunities for the local Native peoples. Under a socio-economic agreement, the Kaska Dena will comprise up to 30 per cent of the work force. Also, the Kaska Dena Nation has an option to purchase a 5 per cent interest in the mine before the end of 1993.

Type:	underground
Location:	45 km north of Watson Lake
Product:	zinc, lead, silver
Mill Capacity:	1500-2 500 tpd
Tonnes Milled:	172 345 t
Reserves:	4.9 million t (November, 1991)
Reserves Grade:	4 per cent lead, 12.7 per cent zinc, 59.9 g of silver per t
Employees:	88 (December 31, 1991)

Seasonal Mine Operations

Anooraq Resources Ltd. produced rhodonite from the Marlin property (c), located near the head of Evelyn Creek, south of Quiet Lake. Anooraq produced 40 t of medium-to high-quality, dark pink to raspberry-coloured, gem quality material.

The King Arctic property (d) continued to produce nephrite jade. It is located in the Frances Lake area, north of Watson Lake. Exploration and mining of jade is conducted during the summer months.

Placer Mining

Placer gold production, reported by payments from approximately 194 placer mining operations in 1990, amounted to 3 482.7 kg of crude gold compared with 4 216.1 kg from about the same number of operations in 1990. The decrease in production in 1991 is attributed partly to the depletion of reserves in traditional mining districts.

Advanced Exploration and Development

In the Vangorda Plateau area, Curragh Resources Inc. was planning preproduction stripping of the GRUM zinc-lead deposit (a). The project requires an incremental capital outlay of \$40 million to remove 74 000 tpd of overburden over approximately 10 months. At year end 1991, Curragh had all of the equipment and infrastructure in place to complete the stripping project, but work was delayed pending the availability of full financing.

Under an option agreement with Archer Cathro and Associates (1981) Limited, Western Copper Holdings Ltd. and Thermal Exploration Company increased both the grade and tonnage of the Williams Creek oxide copper-gold deposit (28), northwest of Carmacks. The companies completed a 55-hole 3 890-m diamond drill program. The tabular deposit is oxidized to a depth of 240 m along a strike length of 395 m. New reserves on the main zone, the largest of 13 zones on the property, are 13 million t grading 1.06 per cent copper, of which 85 per cent is in the oxide category. If developed as an open-pit mine operation, the companies are expecting to use a heap-leach/solvent extraction process followed by electrowinning to produce copper.

Wheaton River Minerals Ltd. could begin production on its wholly owned Skukum Creek gold project, in the Wheaton River area, 56 km south of Whitehorse, as early as September 1992. The property (29) includes the recently acquired Skukum Creek deposit, purchased from Omni Resources Inc. and the adjacent Mount Skukum mine, purchased from Total Energold Corp. Proven, probable and possible reserves total 522 627 t grading 10.53 g of gold per t and 273.94 g of silver per t in three zones. Three drill holes totalling 1 050 m, were completed.

Mineral Dispositions

Quartz claims in good standing at the end of December 1991, totalled 42 268, a drop of 4 429 from the previous year. A total of 4 735 new quartz claims were staked in 1991, down 1 387 from the 1990 total of 6 122.

Table 2: Mineral Dispositions Staked and Lapsed, Yukon, 1989 and 1990

	1991 Calendar Year Staked (Lapsed)	1990 Calendar Year Staked (Lapsed)
Quartz Claims	4 735 (7 658)	6 122 (10 380)
Placer Claims	1 141 (1 272)	1 503 (1 218)
Placer Leases to Prospect	177 (25)	261 (296)

Source: Department of Indian Affairs and Northern Development.

Table 3: Mineral Dispositions in Good Standing, Yukon, 1990 and 1991

	1991 December 31	1990 December 31
Quartz Claims	42 268	46 697
Placer Claims	17 801	17 741
Placer Leases to Prospect	251	345
Iron and Mica Claims	525	525
Coal Leases and Licences	36	36
Dredging Leases	7	12
Total	60 888	65 356

Source: Department of Indian Affairs and Northern Development.

Geoscience Support

On May 7, 1991 the Minister of DIAND and the Yukon government's Minister for Economic Development signed a five-year Canada Yukon Economic Development Agreement which includes a Canada Yukon Co-operation Agreement on Mineral Development. This provides for expenditures of up to \$9 million during 1991-1996 including geoscience (\$6.3 million), mineral technology (\$1.8 million) and public information on mining (\$0.9 million). Most of the geoscience funding will be directed to geological mapping.

The activities and recent publications of Exploration and Geological Services Division (EGSD), Northern Affairs Program, DIAND, in Yukon Region are described in the publication "*Yukon Exploration 1991*". This publication may be obtained by writing to Mr. S.R. Morison, Chief Geologist, Exploration and Geological Services Division, Northern Affairs Program, DIAND, 200 Range Road, Whitehorse, Yukon, Y1A 3V1.

Table 4:
Exploration Drilling, Yukon, 1991

Project	Company	Diamond Drilling		Percussion Drilling	
		Metres	No. of Holes	Metres	No. of Holes
TOM	Cominco	2 883	8		
NIDD	Cominco	1 768	6		
JASON	Phelps Dodge	2 556	8		
BLENDE	NDU/Billiton	11 525	62		
BREWERY CREEK	Hemlo/Loki	4 030	59	34 675	671
WILLIAMS CREEK	WHC/Thermal	3 890	55		
CARPENTER RIDGE	Big Creek Res.	610	5		
NUCLEUS/REVENUE	Big Creek Res.	1 770	16		
GOLDSTAR	Gagan Gold				4
HAGGART CREEK	H-6000/Amax	2 500	16		
ITSI	Noranda	427	7		
TAY-LP	Pacific Comox			942	33
BARB	Pulse Resources	304	4		
CLEAR LAKE	Total Energold/Mitsui	4 500	19		
CHIEFTAIN HILL	Wheaton River Min.	1 050	3		
CASH	Big Creek Res.	396	2		

Source: Exploration and Geological Services Division,
Department of Indian Affairs and Northern Development, Whitehorse, Yukon.

Mineral Exploration

Mineral exploration expenditures increased to \$16 million in 1991 from \$12 million in 1990. There were approximately 60 individual exploration projects in 1991, about the same number as in the previous year. Projects conducted by seven major mining corporations accounted for three quarters of the 1991 exploration expenditures. With the exception of Brewery Creek, a gold property in the Dawson area, all of these projects involved extensive diamond drilling on advanced base metal properties.

Exploration Projects

Base Metals

Billiton Metals Canada Incorporated continued its exploration program on NDU Resources Ltd.'s BLENDE zinc-lead-silver property, northeast of Mayo (9). The program involved geophysical surveys and diamond drilling over a 3.3 km strike length. Most of the mineralization is structurally controlled, forming a tabular stockwork and breccia zones in the Middle Proterozoic Gillespie Group dolomite. The deposit is believed to be a Mississippi Valley type deposit. (see MAP 1)

Drilling in 1991 totalled 11 525 m in 62 holes, including 15 holes in the west zone, 34 holes in the east zone and 13 in the centre, between the east and west zones. The 1991 program significantly increased the geological reserves to approximately 19.4 million t grading 2.81 per cent

lead, 3.04 per cent zinc and 55.88 g of silver per t. These reserves are amenable to open pit mining at a strip ratio of 2.1:1.

Total Energold Corporation and Mitsui Kinzoku Resources of Canada Inc. explored the Clear Lake (10) shale-hosted zinc-lead deposit, located 80 km northwest of Faro. Since 1978, drilling of the Clear Lake deposit has outlined approximately 30 million t of massive sulphides, mainly pyrite, including 5.53 million t grading 11.34 per cent zinc, 1.99 per cent lead and 40.8 g of silver per t. The 1991 work consisted of gravity, induced polarization (IP) and magnetometer surveys, followed by 19 diamond drill holes totalling 4 500 m.

In the Macmillan Pass area, northeast of Ross River, Cominco Ltd. continued its extensive program to test the extensions of TOM deposit (11), under an option agreement with Hudson Bay Mining and Smelting Co. Limited. Published mineable reserves for the TOM deposit are 9 283 700 t grading 7.49 per cent lead, 6.19 per cent zinc and 69.4 g of silver per t. In 1991, Cominco drilled eight holes on peripheral geochemical and geological targets, for a total of 2 883 m. The company found no new centres of mineralization, and the option was dropped.

Cominco also continued drilling on its wholly owned NIDD (12) zinc property, located 20 km northwest of the TOM deposit. The company drilled six holes totalling 1 768 m on the main Boundary Creek mineralized centre and its western extension.

Also in the Macmillan Pass area, Phelps Dodge Corporation of Canada continued its option on the JASON (13) property, owned by the Western Canadian Mining Corporation, Ogilvie Mineral Corp. and Abermin Corporation. Phelps Dodge completed eight diamond drill holes totalling 2 556 m to test favourable stratigraphy south and east of the Main and South zones. The three known zones of the JASON deposit have geological reserves of 14.1 million tonnes grading 7.09 per cent lead, 6.57 per cent zinc and 79.9 g of silver per t.

Big Creek Resources Ltd. conducted a diamond drill program on the REVENUE-NUCLEUS (14) copper porphyry properties. Two drill holes encountered copper and gold-bearing supergene and hypogene mineralization.

First Yukon Silver Resources conducted trenching on the DAN (formerly BAR) showing (15) near Swift River. Trenching exposed zinc-bearing mineralization up to 1.5 m wide.

Placer Dome Inc. conducted geological, geochemical and ground geophysical surveys on the KONA (formerly Fyre Lake) copper-zinc-silver property north of Watson Lake. The company optioned the property (16) from Welcome North Resources Limited. The Kona deposit is a flat-lying volcanogenic massive sulphide deposit with geological reserves of 1.5 million t, grading 1 per cent copper, 1 per cent zinc, 4.66 g of silver per t and 0.62 g of gold per t.

Big Creek Resources Ltd. explored the CARPENTER RIDGE (17) lead-zinc-silver property, 25 km west of the BLENDE property. The company drilled five diamond drill holes totalling 610 m. Galena and sphalerite occur in moderately dipping veins and breccia adjacent to Cretaceous and older diorite dikes, which cut Proterozoic Gillespie Lake Group dolomite. The drilling program resulted in the intersection of several veins including one of 5 m grading 9.5 per cent combined lead and zinc, and another of 9.3 m grading 4.5 per cent combined lead and zinc.

Noranda Exploration Co. Ltd. conducted trenching on the AZ property (18), north of White River. Copper-gold skarn mineralization occurs in the Chitistone limestone and calcareous rock of Late Triassic age and as disseminations within the underlying Nikolai Greenstone amygdaloidal basalts. Work in 1991 also included mapping, soil sampling and geophysical surveys. Areas with coincident anomalies were trenching.

Pulse Resources Ltd. funded a drill program on Barytex Resources Corporation's MATT BERRY property (19), located 160 km north of Watson Lake. The property is also known as the BARB. The BARB deposit is a sediment-hosted zinc-lead-silver deposit with drill inferred geological reserves of 530 000 t grading 10 per cent combined zinc and lead and 102.85 g of silver per t. Drilling in 1991 was concentrated on the Money Zone, located 1.5 km northwest of the BARB deposit.

Gold

On the BREWERY CREEK property (20), east of Dawson, Loki Gold Corporation (49 per cent) and Hemlo Gold Mines Inc. (51 per cent) continued extensive drilling to further delineate known mineralization. The 1991 work included 671 reverse circulation drill holes totalling 34 675 m, 59 diamond drill holes totalling 4 030 m and 49 trenches totalling 12 727 cubic m. Calculated diluted preliminary reserves amount to 15.46 million t in nine deposits with an average grade of 1.88 g of gold per t.

Oxide reserves account for 10.8 million t of the total and grade 1.988 g of gold per t with a stripping ratio of 1:1.17. This ore estimate represents a modest increase from the estimate released in 1990.

Amax Gold Inc. conducted a drilling and trenching program in the Mayo Mining District near SCHEELITE DOME and HAGGART CREEK (21). The company completed 2 500 m of diamond drilling and 2.3 km of trenching.

Aurchem Exploration continued exploration on its GOULTER option (22) located west of Carmacks adjacent to the MT. NANSEN property of BYG Natural Resources Inc. The GOULTER property includes the Willow Creek and Eliza Creek zones. Work in 1991 consisted of a grid expansion followed by a property-wide induced polarization (IP) survey and a VLF electromagnetic survey. Magnetometer surveys were conducted over specific target areas.

On the ITSI property (23), south of Macmillan Pass, Noranda Exploration Co. Ltd. conducted a trenching and diamond drilling program. The company also trenched on the PUTZ-BENNETT property, located north of Macmillan Pass. The company targeted gold-bearing quartz veins which occur along the margins of Cretaceous intrusions.

Pacific Comox Resources Ltd. explored the SEAGULL CREEK (TAY-LP) (24) property, located south of Ross River. The 1991 program included 653 line-kilometres of airborne magnetometer and electromagnetic surveys and 942 m of reverse circulation drilling. Seventy claims were staked. The drill program located three zones of significant mineralization in the west zone.

Noranda Exploration Co. Ltd. explored the JOSEPHINE property (25), in the Clear Creek area. Work included geochemical sampling, magnetometer and induced polarization (IP) surveys and trenching. Gold and arsenopyrite occur in veins within a shear zone on the property.

The BEAR property (26), located south of Antimony Mountain, was staked by Noranda Exploration Co. Ltd., in 1990. Work in 1991 consisted of geological, geochemical and geophysical surveys followed by trenching.

Arbor Resources Inc. continued exploration on its substantial holdings in the Klondike area near Dawson. Reconnaissance work on recently staked ground and

more detailed work near the LONESTAR property (27) took place in 1991. The detailed work included trenching which revealed a shear zone running parallel to Eldorado Creek. Chip sampling on the structure gave encouraging assays.

MINES AND MINERAL ACTIVITIES 1991

Northwest Territories

Mineral Production

Five gold mines and two zinc-lead mines operated in the Northwest Territories during 1991 (Map 2). Production statistics for the mines are given in Table 5.

The value of mineral production in the Northwest Territories was estimated at \$544.6 million in 1991 compared with \$729.7 million in 1990. The lower value of mineral production in 1991, compared with the previous year, was due largely to lower zinc, lead, gold and silver prices.

Production at Northwest Gold Corp.'s new Colomac mine was suspended at the end of June 1991 after 14 months of production. The mine was mothballed and placed on a standby basis pending an improvement in gold prices and financial restructuring.

Together lead and zinc accounted for 56.1 per cent of the total value of mineral production in the Northwest Territories, while gold accounted for 40.5 per cent.

Exploration expenditures were up slightly over 1990, when expenditures amounted to some \$36 million. In mid-November, a claim-staking rush in the central part of Slave Province, north of Yellowknife, was started when BHP-Utah Mines Ltd. and Dia Met Minerals Ltd. announced the discovery of a diamondiferous kimberlite pipe. The companies announced that 81 small diamonds, all measuring less than two millimetres in diameter, had been recovered from a 59 kg sample of kimberlite drillcore.

Between November 1, 1991 and April 10, 1992, 2 582 new claims were recorded in the Northwest Territories covering 7 458 sq km. Most of the staking was in the central part of Slave Province.

The mineral industry in the Northwest Territories accounted for 20.7 per cent of the zinc, 13.1 per cent of the lead and 9.4 per cent of the gold produced in Canada during 1991. These metals accounted for 5.1 per cent of the value of Canada's metallic mineral production compared with 6.9 per cent in 1990.

The six operating mines in the Northwest Territories at year end 1991 employed 1 565 people compared with 1950 people at year end 1990.

Mines

Cominco Ltd., Polaris Mine

The Polaris zinc-lead mine (b)**, concentrator and related exploration properties are 77.5 per cent owned by Cominco and 22.5 per cent by Pine Point Mines Limited. Cominco is the operator of the joint venture. The underground Polaris mine, located on Little Cornwallis Island, is celebrating its tenth full year of operation in 1992.

In 1991, the Polaris mill processed a record 1 069 300 t of ore grading 12.5 per cent zinc and 3.2 per cent lead to yield 163 700 t of zinc concentrate grading 61.3 per cent zinc and 31 400 t of lead concentrate grading 77.7 per cent lead. The average ore grade processed in 1991 was 12.5 per cent zinc and 3.2 per cent lead compared with 14.4 per cent zinc and 4.0 per cent lead in 1990. Ten shipments of lead and zinc were made to Europe between June 25, 1991 and October 27, 1991 for a total of 252 000 t.

Exploration drilling was carried out on nearby Truro Island, and results were sufficiently encouraging to justify further work in 1992.

Type:	underground
Location:	Little Cornwallis Island (120 km northwest of Resolute)
Product:	zinc, lead
Mill Capacity:	3 100 tpd
Tonnes Milled:	1 609 300 t
Reserves:	10.02 million t (December 31, 1991)
Reserve Grade:	14.0 per cent zinc, 3.9 per cent lead
Employees:	246 (December 31, 1991)

** Numbers or letters in parenthesis indicate the location of the property on Maps 2 and 3.

Table 5:
Mineral Production of Operating Mines, Northwest Territories, 1989, 1990 and 1991

Company, Mine and Commodity	1989		1990		1991(P)	
	t	kg	t	kg	t	kg
Cominco Ltd.						
Polaris Mine						
zinc	139 190		142 392		100 348	
lead	32 060		37 692		24 398	
Echo Bay Mines Ltd.						
Lupin Mine						
gold		6 082		6 072		6 746
Royal Oak Mines Inc.						
Giant Mine						
gold		3 270		3 647		3 183
Nanisivik Mines Ltd.						
Nanisivik Mine						
zinc	57 328		56 200		54 800	
lead	2 448		1 400		400	
silver		16 956		18 100		18 500
NERCO Con Mine Ltd.						
Con Mine						
gold		2 992		3 643		3 825
silver		621		N/A		N/A
Northwest Gold Corp.						
Colomac Mine						
gold				2 130		2 423
Tremanco Resources Ltd.						
Ptarmigan Mine						
gold		478		585		N/A

Source: Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

(P) = Preliminary N/A = Not available



MAP 2 **MINERAL EXPLORATION AND MINES** **NORTHWEST TERRITORIES, 1991**

LEGEND



Producing Mines

- a Royal Oak Mines Inc. (Giant Mine); Au, Ag
 Nerco-Con Mine Ltd. (Con Mine), Au, Ag
 Tremanco Resources Ltd., (Ptarmigan Mine), Au, Ag
- b Cominco Ltd., (Polaris Mine), Pb, Zn
- c Nanisivik Mines Ltd., (Nanisivik Mine), Pb, Zn, Ag
- d Northwest Gold Corp., (Colomac Mine), Au, Ag
- e Echo Bay Mines Ltd., (Lupin Mine), Au, Ag



Areas of Mineral Exploration Activity
 Refer to N.W.T. Table and Text

SCALE



Road



Areas of Exploration Activity
 Refer to N.W.T. Table and Text



URANIUM, RARE EARTH ELEMENTS



GOLD, SILVER



ZINC, LEAD, COPPER



DIAMOND

Echo Bay Mines Ltd., Lupin Mine

The Lupin gold mine (e) is located 90 km south of the Arctic Circle and approximately 400 km northeast of Yellowknife. In 1991, the mine produced a record 6 745.6 kg of gold compared with 6 072.4 kg in 1990. The Lupin mill processed 1 813 tpd of ore for a total of approximately 660 000 t. This compared with 1 726 tpd of ore for a total of 628 000 t in 1990.

Mining in 1991 was at depths ranging from 120 m to 640 m. Lupin's reserves extend to a depth of 1 170 m, and in 1991 development drifts were extended at a depth of 1 130 m.

Type:	underground
Location:	400 km northeast of Yellowknife
Product:	gold
Mill Capacity:	2 000 tpd
Tonnes Milled:	660 000
Reserves:	3.84 million t (December 31, 1991)
Reserve Grade:	10.15 g of gold per t
Employees:	350

Nanisivik Mines Ltd., Nanisivik Mine

Nanisivik Mines Ltd. is wholly owned by Conwest Exploration Company Limited. In 1991, mill production at the Nanisivik mine (e) totalled to 705 000 t of ore at an average grade of 8.1 per cent zinc, 0.4 per cent lead and 36 g of silver per t compared with 716 400 t grading 8.1 per cent zinc, 0.4 per cent lead and 35 g of silver per t in 1990. Zinc concentrate production in 1991 declined slightly to 98 200 t from 100 700 t in 1990. The main ore zone at the Nanisivik mine contributed about 30 per cent of the mill feed in 1991; the remainder came from satellite zones. The company replaced approximately 60 per cent of the ore mined during the year with new ore reserve additions. It is anticipated that the existing reserve base, together with anticipated additional reserves, will support continuing production to 1997.

Type:	underground
Location:	27 km east of Arctic Bay, Baffin Island
Product:	zinc, lead, silver
Mill Capacity:	2 000 tpd
Tonnes Milled:	705 000 t
Reserves:	2 420 000 t (December 31, 1991)
Reserve Grade:	8.5 per cent zinc, 0.3 per cent lead, 40 g of silver per t
Employees:	215

NERCO Con Mine Ltd., Con Mine

NERCO Con Mine Ltd. is a unit of NERCO Minerals Company and both are wholly owned by NERCO Inc. In 1991, NERCO Con (a) set a new production record of 3 825 kg of gold from 332 000 t of ore milled. This compares with 3 642.7 kg of gold produced in 1990 from 285 960 t of ore. Production was from underground workings between the 2 300 - and 5900-foot levels.

A \$19 million autoclave pressure oxidation circuit is being added to the NERCO Con mill to treat refractory ore, arsenic sludges and calcine wastes.

Type:	underground
Location:	1.4 km south of Yellowknife
Product:	gold, silver
Mill Capacity:	650 tpd
Tonnes Milled:	332 000 t
Reserves:	3.11 million t (December 31, 1991)
Reserve Grade:	10.29 g of gold per t
Employees:	395

Northwest Gold Corp., Colomac Mine

Northwest Gold Corp., the owner and operator of the Colomac gold mine (d), is 52 per cent owned by Northgate Exploration Ltd. The Colomac Mine began operations on May 1, 1990, and operated continuously for the next 14 months. Due to financial constraints, lower than anticipated operating performances and low gold prices, the operation was suspended on June 30, 1991 and was mothballed and placed on a standby basis.

During 1991, a total of 1.12 million t of ore were processed to yield approximately 2 423.6 kg of gold.

Type:	open pit
Location:	219 km north-northwest of Yellowknife
Product:	gold
Mill Capacity:	10 000 tpd
Tonnes Milled:	1.12 million t
Reserves:	N/A
Reserve Grade:	N/A
Employees:	190 (May 31, 1991)

N/A: Not available

Royal Oak Mines Inc., Giant Mine

In July 1991, Royal Oak Mines Inc. was formed by the amalgamation of Royal Oak Resources Ltd., Pamour Inc., Pamorex Minerals Inc., Akaitcho Yellowknife Gold Mines Limited and Giant Yellowknife Mines Limited. All the ore production from the Giant mine (a) in 1991 was from underground workings. The Giant mill processed 390 065 t of ore at an average grade of 9.394 g of gold per t to yield 3 183 kg of gold. This compares with 347 079 t of ore at an average grade of 9.942 g of gold per t to yield 3 009.8 kg of gold and 649 156 t of tailings at an average grade of 2.08 g of gold per t to yield 637.2 kg of gold in 1990.

Type:	underground
Location:	2.4 km north of Yellowknife
Product:	gold, silver
Mill Capacity:	1 000 tpd
Tonnes Milled:	390 065 t
Reserves:	2 121 903 t (December 31, 1991)
Reserve Grade:	10.662 g of gold per t
Employees:	325

Tremanco Resources Ltd., Ptarmigan Mine

At the Ptarmigan mine (a), gold production for the company's 1991 fiscal year (August 1, 1990 to July 31, 1991) amounted to 462.38 kg. The total ore milled during this period was 52 707 t grading 9.70 g of gold per t. For the six month period from August 1, 1991 to January 31, 1992, production amounted to 277.35 kg of gold from a mill throughput of 22 861 t grading 12.72 g of gold per t. Ore production was from the 400-foot level of the C vein and the 450-, 600- and 750-foot levels of the Ptarmigan mine.

Type:	underground
Location:	20 km east of Yellowknife
Product:	gold
Mill Capacity:	180 tpd
Tonnes Milled:	52 707 (fiscal year 1991 ended July 31, 1991)
Reserves:	121 653 t (July 31, 1991 at Ptarmigan and Tom mines)
Reserve Grade:	10.973g of gold per t
Employees:	30

MAP 3
MINERAL EXPLORATION AND MINES
IN SLAVE STRUCTURAL PROVINCE, 1991

LEGEND

(20) Areas of Mineral Exploration Activity,
Refer to N.W.T. Table and Text

Gold, Silver

Zinc, Lead, Copper

Diamond

Producing Mine

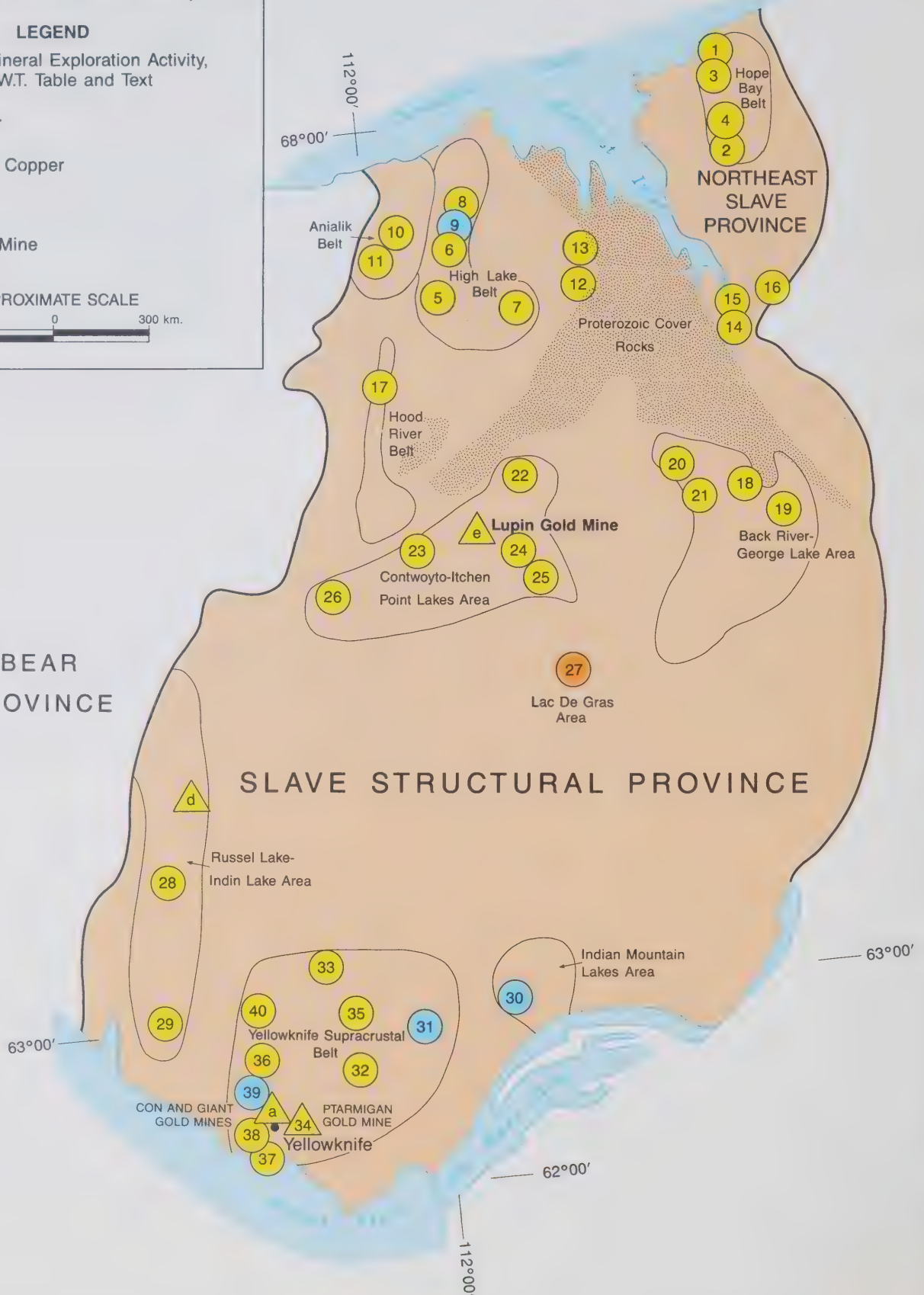
APPROXIMATE SCALE

300 0 300 km.

BEAR
PROVINCE

SLAVE STRUCTURAL PROVINCE

NORTHEAST
SLAVE
PROVINCE



Development

Ger-Mac Exploration Ltd. collared a new portal on the MON gold property (36), drove 153 m of drifts and raises, and mined a 550 t bulk sample from underground. The company planned to bring a small mill to the site in the winter of 1991-1992 to process the ore.

Mineral Dispositions

Staking in 1991 was concentrated mainly in the shield areas of Slave Province, Bear Province and Keewatin District. Gold and diamonds were the primary targets.

The number of claims staked in 1991 increased dramatically in November and December after the announcement of the discovery of diamonds in the Lac de Gras area. Most of this staking was in National Topographic Sheet areas (NTS) 75 D and E and in 86A. By year end, 831 claims covering 666374 hectares (ha) were recorded compared with 441 claims covering 355 346 ha in 1990 (Table 6). The Lac de Gras diamond staking accounted for approximately 515 000 ha in 1991 and nearly 800 000 ha in January and February 1992.

Thirty-four prospecting permits were issued at the end of January 1991. Copper was the primary target of 12 permits issued on Victoria Island, and gold was the major target of most of the 15 prospecting permits issued in the Rae and Hearne provinces of southeast Mackenzie District, east of Great Slave Lake.

Geoscience Support

The Canada Northwest Territories Economic Development Framework Agreement was signed in February 1991 by the Minister of DIAND and the Government of the Northwest Territories' Minister of Economic Development and Tourism. Under the Agreement, the Department of Indian and Northern Affairs and the Government of the Northwest Territories will co-operate in the delivery of economic development initiatives. The Mineral Development Agreement, known as the Mineral Initiative Program, has a total budget of \$8.2 million over the period from, 1991-1996, divided as follows:

Geoscience Initiative	\$7 500 000
Technology Initiative	\$200 000
Information Initiative	\$200 000
Prospectors Initiative	\$300 000

The activities and recent publications of Geology Division, Northern Affairs Program, DIAND, in Northwest Territories Region are described in the publication

entitled *Exploration Overview 1991*. It may be obtained by writing to Dr. W. Padgham, Chief Geologist, Geology Division, Northern Affairs Program, DIAND, P.O. Box 1500, Yellowknife, N.W.T., X1A 2R3.

Mineral Exploration

Mineral exploration expenditures in the Northwest Territories in 1991 were estimated to have marginally increased over the \$36 million expended in 1990. Some 109 properties were explored in 1991 compared with 92 in 1990. Major mining companies were responsible for approximately 80 per cent of the exploration expenditures.

Table 6: Mineral Claims, Leased Claims, Prospecting Permits, Northwest Territories, 1990 and 1991

	1991 Calendar Year	1990 Calendar Year
Number of Claims and Leases in Good Standing	3 859	3 868
Hectares	2 519 428	2 329 769
Number of Leased Claims	11 396	11 548
Hectares (Surveyed)	277 181	281 144
Claims Recorded	831	441
Hectares	666 374	355 346
Representation Work on Claims only (\$s)	6 533 062	17 834 000
Prospecting Permits Issued	34	67
Hectares	634 940	1 295 853
Prospecting Permits Cancelled, Expired or Relinquished	49	20
Prospecting Permits In Good Standing	91	106
Hectares	1 760 476	1 989 083
Exploration Reported on Prospecting Permits (\$s)	731 549	4 841 751

Source: Mining Lands Division, Department of Indian Affairs and Northern Development, Yellowknife, N.W.T.

Table 7: Diamond Drilling, Northwest Territories, 1990 and 1991

	1991 Calendar Year	1990 Calendar Year
	Metres (m)	
Surface Drilling	110 527	113 933
Underground Drilling	73 347	74 745
Total Drilling	183 874	188 678

Source: Geology Division, Department of Indian Affairs and Northern Development, Yellowknife, N.W.T.

Major programs include BHP-Utah Mine's program for gold on the CROWN-ULU claims (5) between the Hood and James rivers; the program by Homestake Mining Company and Kerr-McGee Corporation on the George Lake iron formation-hosted gold deposits in the Back River area, south of Bathurst Inlet (18); the program by Lucky Eagle Mines, Agnico Eagle Mines Ltd. and Hecla Mining Company of Canada Ltd. on the Meadowbank River iron formation-hosted gold deposits, north of Baker Lake (58); the program of Asamera Minerals Inc. and Comaplex Minerals Corp. on iron formation-hosted gold deposits, northeast of Rankin Inlet (52); and the program of Urangesellschaft Canada Ltd., PNC Exploration (Canada) Co. Ltd. and Daewoo Corp. on uranium prospects, west of Baker Lake (64) and southwest of the Kiggavik uranium deposit. All of these projects included significant expenditures on diamond drilling.

One of the most interesting exploration plays of the decade is unfolding in the central part of Slave Province where BHP-Utah Mines and Dia Met Minerals have acquired a large block of ground, approximately 815 square kilometres in area, covering their Lac de Gras diamondiferous kimberlite discovery (27). Diamond exploration gained prominence in November 1991, when Dia Met Minerals announced the recovery of 81 small diamonds from a drillcore section. A bulk sample was obtained from the discovery kimberlite pipe using a drill

rig during the winter of 1992 and was shipped to a Fort Collins, Colorado diamond recovery plant during the spring of 1992. A small mobile plant was brought to the site in 1991 to test till and esker samples for kimberlite indicator minerals.

Diamond drilling in 1991 was mainly for gold, and the major exploration programs mentioned previously accounted for most of the drilling (Table 7).

Exploration Projects

Northern Slave Structural Province

Hope Lake Volcanic Belt

GSA Management Ltd. and Goldcorp Investments Ltd. drilled several holes along the northeast trend of the Wombat (Granite) gold prospect at Roberts Lake (1) (see Map 2 and Map 3).

BHP-Utah Mines Ltd. staked the BOSTON (2), SANTIAGO & MADRID (3) and HAVANNA (4) claims. Prospecting and geological mapping were conducted on the BOSTON and KAMIK (2) claims. Twenty-five line-kilometres of a VLF magnetometer survey were completed on the BOSTON claims, and 14 line-kilometres of a VLF magnetometer survey were completed on the KAMIK claims.

High Lake and Anialik Volcanic Belts

BHP-Utah Mines Ltd. explored the central part of the High Lake Belt on a large package which includes the DEN-FIDO group, optioned from Aber Resources. The focus was on the ULU property (5). Surveys on the property included geological mapping, 32.1 line-kilometres of a VLF magnetometer survey, 11.0 line-kilometres of an induced polarization (IP) survey and 8 line-kilometres of a soil geochemical survey. Three trenches totalling 45 m in length were excavated, and a total of 21 000 m was drilled in 42 holes to delineate the FLOOD ZONE gold deposit and to test peripheral targets. The deposit is a fracture-controlled quartz-vein and silicified zone with a strike length of approximately 400 m.

On the adjacent CROWN and DEN-FIDO claims (5), BHP-Utah completed a geological mapping program. On the CROWN property, a 5 line-kilometre VLF electromagnetic and magnetometer survey, and a HL electro-

magnetic survey were completed. On the DEN-FIDO, a 14 line-kilometre VLF electromagnetic and magnetometer survey was completed. On the CROWN claims, a polymetallic zone in metavolcanics was tested with 484 m of drilling in two holes. On the DEN-FIDO claims, five holes totalling 403 m were completed. To the south, geological mapping was conducted on the PULSE, KINDLE AND SINGLETON claims.

On the BAMAKO-PARIS claims (6), BHP-Utah conducted geological mapping and completed 25 line-kilometres of a VLF electromagnetic and magnetometer survey. Mapping was completed on the nearby BRAVO claims.

On the HOTEL claims (7), BHP-Utah conducted geological mapping and completed a 3 line-kilometre VLF electromagnetic and magnetometer survey. A gold showing was tested with 325 m of drilling in seven holes. On the nearby SPARK claim, geological mapping and a small soil-sampling survey were conducted.

In the northern High Lake Belt, BHP-Utah completed 1:10 000 scale geological mapping on the CAIRO, ROMA and CYGNET properties (8). On the ROMA claims, geological mapping, soil sampling and VLF electromagnetic and magnetometer surveys were conducted on a 22 line-kilometre grid. Ten holes totalling 465 m were drilled to test a gold-bearing quartz vein. On CYGNET, 1:2000 scale geological mapping and VLF electromagnetic and magnetometer surveys were completed on a 22 line-kilometre grid to evaluate arsenopyrite-bearing shear targets.

Kenngo Explorations (Canada) Limited conducted a geophysical and geochemical survey on its High Lake claims at High Lake (9). The claims contain the High Lake massive sulphide deposit.

BHP-Utah Mines Ltd. completed geological mapping on its ARNICA claims (10) in the Anialik Belt. The mapping extended into parts of surrounding Prospecting Permit 1181. In the southern Anialik Belt, BHP-Utah conducted geological mapping on Prospecting Permit 1285 (11).

Other Projects in Northern Slave Structural Province

Cogema Canada Ltd. explored for gold in the Torp Lake metasedimentary belt, adding the LUI claims (12) and MARC claims (13) to its holdings previously staked in the area, namely the JOE claim and EDY-LACH claim group.

Cogema Canada Ltd. explored several claim blocks in the Tinney Hills-Hiukitak River area for amphibolitic iron-formation hosted gold deposits (14, 15, 16).

Hood River Volcanic Belt

BHP-Utah Mines Ltd. prospected the TAK claim (17).

George Lake-Back River Area

The George Lake Joint Venture, comprising Homestake Mineral Development Company (73.75 per cent) and Kerr-McGee Corporation (26.25 per cent), continued to work on gold prospects in iron formations at George Lake (18). The 1991 program continued intensive exploration on the property and was principally directed to infill drilling on the Locale 1 and Locale 2 gold deposits. On the BRAU claims a total of 28690 m were drilled in 140 holes to test gold deposits in iron formation. Activities also included trenching, ground geophysical surveys and geological mapping. Mining of underground bulk samples is anticipated in 1992.

The Back River Joint Venture, comprising Homestake Mining Company Ltd., Kerr-McGee Corporation and the MacLab Group, conducted geological and geophysical surveys and drilled targets at Boot Lake (19). The project was managed by Trigg Woollett Olsen Consulting Ltd.

Echo Bay Mines Ltd. drilled for Bathurst-Norseman (Hackett River) style massive sulphide mineralization on the PXD-FEG-BEB claim group (20) and drilled iron-formation targets for gold on the BUCK-NUTS claim group (21). The company conducted reconnaissance surveys on its properties in the Beechy Lake-Back River area.

Contwoyto-Itchen-Point Lakes Area

Exploration in this area was for Lupin-type iron-formation hosted gold deposits.

Joint venture partners, Cominco Ltd., the operator, and Cogema Canada Ltd. continued work on the COCO claims (22) by prospecting and conducting 60 line-kilometres of magnetometer and HLelectromagnetic surveys. Electromagnetic conductors were tested by 915 m of drilling in 10 holes.

Cominco Ltd. drilled 10 holes totalling 1 200 m to test the LST claim (23). Drilling intersected geochemically anomalous sulphide-rich iron formations.

Echo Bay Mines Ltd. continued exploration on its Lupin Mine leases, the adjacent PXD 2 claim and the FIN claim (e). On the leases and the PXD 2 claim, a 200 line-kilometre HL electromagnetic survey and magnetometer survey were completed to end a three-year geophysical program targeted at iron formations. Mapping, sampling and prospecting together with 6 200 m of drilling in 65 holes were completed. On the FIN claim, 50 line-kilometres of magnetometer and HL electromagnetic surveys were conducted.

Cogema Canada Ltd. established an 18 line-kilometre grid on the AU claims (24) for control of geological mapping, magnetometer and VLF electromagnetic surveys. Cogema also prospected the western part of the Gossan Lake property.

Contwoyto Goldfields Ltd. contracted Covello, Bryan and Associates to complete magnetometer, VLF electromagnetic and HL electromagnetic surveys on a 25 line-kilometre grid on the IF 3 claim and to map and sample the IF 4 claim (25).

Royal Oak Mines Inc. explored the P claims (26) by establishing two grids for geological mapping and by completing 60 line-kilometres of VLF electromagnetic and magnetometer surveys.

Lac de Gras Area

In the Lac de Gras area, Dia Met Minerals Ltd. (49 per cent) and joint venture partner BHP-Utah Mines Ltd. (51 per cent) contracted CF Minerals of Kelowna, British Columbia, to conduct kimberlite indicator mineralogical sampling of till and eskers on claims A, B, C, D, E, F, T, M and W (27). A total of 2 400 heavy-mineral samples were processed by CF Minerals to confirm the presence of kimberlite bodies. Airborne and ground geophysical surveys were also completed. The results confirmed the presence of kimberlite.

In November 1991, the joint venture partners announced the recovery of 81 diamonds, some of gem quality, from a 59 kg sample taken from a 141.7-m long section of kimberlite in a single drillcore. All the diamonds measured less than 2 mm in diameter. BHP-Utah, the operator, planned a winter exploration program to bulk sample 180 t of the kimberlite. The release of this spectacular

information resulted in a staking rush. More mining claim tags were sold in Yellowknife in October and November 1991 (1 108) than were sold in the previous nine months. BHP-Utah Mines staked the GO and ED claims comprising 95 110 ha adjoining their other claim holdings in the area.

Monopros Ltd., a Canadian subsidiary of De Beers Consolidated Ltd., also conducted heavy mineral sampling of eskers in the area (27) in a search for kimberlite indicator minerals.

In December 1991, Aber Resources began its purchase of West Viking Exploration and its extensive claim holdings (27) adjacent and to the east of Dia Met Minerals' and BHP-Utah's claims.

Southern Slave Structural Province

Russell Lake-Indin Lake Area

Northwest Gold Corporation completed a winter geophysics and drill program on the Colomac mine lease (d) and on adjacent ground optioned from Petromet Resources Limited and Comaplex Resources International Ltd. This work resulted in the stripping, sampling and drilling of Zone 24 on the ED 1 claim. Additional work included mapping and staking of the NWG 1-6 group, staking of the KNOB 1-2 claims, linecutting on the NWG 2 claim and a VLF electromagnetic survey on the CARON 3 and NWG 2 claims.

Robert Curtis prospected the CURTIS and MARY claims (28) at Wijinnedi Lake and established the presence of iron formation carrying up to 62 parts per billion of gold.

Fortune Minerals Ltd. prospected, sampled and mapped the ROBIN-NATASHA-YELLER-IRON claim group along the Bouso River (29). On the ROBIN claims, chip samples of Lupin-type gold mineralization yielded 7.48 g of gold per t across 2.8 m.

Indian Mountain Lake Area

BHP-Utah Mines Ltd. prospected the COTTONGRASS claims (30) for base metals.

Yellowknife Supracrustal Basin

Cameron-Beaulieu Rivers Belt

Nanisivik Mines Ltd. drilled one hole at Sunrise Lake on the SHEET claim (31) to test for polymetallic sulphide mineralization adjacent to the Sunrise deposit of Aber Resources Ltd. and Hemisphere Development Corp.

NERCO Minerals Inc. mapped and sampled for gold on the VIC claims (32).

Yellowknife Turbidite Basin

An agreement between Athabaska Gold Resources Ltd. and Chevron Minerals Ltd. allows Athabaska to purchase Chevron's 40 per cent interest in the Nicholas Lake deposit (33). More than 16 000 m of drilling has identified a preliminary reserve of 429 000 t grading 15.78 g of gold per t. An \$800 000 exploration program, which started in November 1991, was financed by Royal Oak Mines Inc. The program was designed to test mineralized zones located off the Main Zone. Grids were cut on areas of interest and magnetometer, VLF electromagnetic and induced polarization (IP) surveys were completed. Several drill targets were identified.

Tremingo Resources Ltd. continued to explore its TOM and PTARMIGAN gold mine properties (34).

Knut Rasmussen reported that a 1 500-t bulk sample mined in 1990 from the DAF deposit (35), was trucked on the winter (ice) road from Burnt Island to Tremingo's Ptarmigan mill for processing. The grade of ore was 19 g of gold per t.

Yellowknife Volcanic Belt

Ger-Mac Exploration Ltd. collared a new portal on the MON property (36) and drifted 70 m to intersect the main vein. The vein was explored by drilling and driving 63 m of drifts and two 10-m long raises. A 550-t ore sample was mined, and Ger-Mac planned to bring a small mill to the site during the winter of 1991-1992 to process the ore. A reserve of 7 000 t with a mineable grade of 13.3 g of gold per t is reported.

On the MARLIN claims (37), Golden Marlin Resources Ltd. and joint venture partner CAMECO drilled five holes totalling 775 m. Drilling intersected a mineralized structure; however, gold values were low. Golden Marlin also

completed a 10-km detailed induced polarization (IP) survey and 540 m of drilling on the HOPE claims, to earn a 50 per cent interest with joint venture partner Rayrock Yellowknife Resources Inc.

Nerco Minerals continued exploration of its mine leases (38). Surface work included mapping and lithogeochemical sampling of the TAN and KEMEX claims and the drilling of three holes totalling 1200 m at Kam Point to test the Campbell Shear. The company completed one 300-m hole at Back Bay on the NKANA claims and two holes for 900 m at Fault Lake on the AYE claims, where another two holes for 700 m were planned before year end. The C16 Shear was explored by 600 m of drilling in six holes.

Royal Oak Mines Inc. conducted prospecting, sampling and line cutting to define drill targets. Targets included a polymetallic sulphide deposit on the G claims (39) at Homer Lake.

Tremingo Resources Ltd. and DIW Geological Consultants Ltd. conducted geological mapping, prospecting and sampling on the KAM claims (40).

Bear Structural Province

Aber Resources Ltd. mapped and sampled Proterozoic sediments on the DV claims (41) at DeVries Lake, where copper showings are associated with gold and tungsten. Aber also completed mapping and trenching on the POINT claims (42) in the Balachey Lake area, where gold and copper assays were obtained from previously reported uranium showings.

Cominco Ltd. completed prospecting, mapping and soil sampling to evaluate the base-metal potential of Proterozoic sediments on prospecting permits 1246-1247 in the Robb Lake area (43) and Prospecting Permit 1244 on the Wopmay Lake area (44). Geological, geochemical and geophysical surveys were also conducted on the NOR-SP-A1 group (41) at Norris Lake, to assess the base metal potential of the claims. Additional claim staking of the CU 1-20 group (45) was completed in the Coppermine River area to adjoin the CPR 0-8 claims acquired in 1990.

Noranda Exploration Co. Ltd. conducted geological mapping, prospecting and geochemical surveying on the MAT 1-24 claims (46) to evaluate the copper potential of the Rae Group.

Norman Hennel trenched and sampled rare earth element-bearing volcanics of the Port Radium and Echo Bay Formations on the SCANDIUM claim (47) near Surprise Lake.

Southeast Mackenzie District and the Great Slave Lake Plain

B.P. Resources Canada Ltd. conducted geochemical sampling of claims near the Horn Plateau (48).

Cominco Ltd. conducted gravity and airborne magnetic surveys of claim blocks near Racoon Lake, Mink Lake (49) and Chedabucto Lake (50).

PNC Exploration (Canada) Ltd. conducted electromagnetic surveys and drilled nine holes totalling 1 774 m on the BOOM 1 and 2 claims (51) at Boomerang Lake, near the western edge of the Thelon Basin.

District of Keewatin

Asamera Minerals Inc., in a joint venture with Comaplex Minerals Corp., conducted geological mapping, lithogeochemical sampling, a 4 000 line-kilometre airborne magnetic survey, a VLF electro-magnetic survey and a 1 000 line-kilometre airborne co-axial electromagnetic survey on the NAT claims (52) and adjacent permits in the Meliadine River area, northeast of Rankin Inlet. In the Discovery Zone area (52), 4 540 m of drilling, a ground magnetometer survey and a VLF electromagnetic survey were completed. In the Western Lands project area, west of the Discovery Zone, magnetometer, VLF and horizontal-loop MAXMIN electromagnetic surveys and 730 m of drilling were completed. New claims were staked (NAT 34-41) in this same area. New prospecting permits (PP 1282-1284) east of Peter Lake were explored (53).

Comaplex Minerals Corp. conducted prospecting and mapping on the TAV claims in the Copperneedle River area (54) and on new prospecting permits (PP 1272-1275, 1278, 1279) in the Parker Lake-McQuoid Lake area (55) as well as in the Poorfish Lake Windy Lake area (56) (PP 1276, 1277, 1280, 1281). Follow-up prospecting was conducted on prospecting permits (PP 1233-1237, 1251) in the Montgomery Lake-Otter Lake area (57).

Kaminak Resources Ltd. prospected on a new prospecting permit (PP 1265) and staked new claims at the southeast end of Gibson Lake (53).

On behalf of Lucky Eagle Mines, Agnico Eagle Mines Ltd. and Hecla Mining Company of Canada Ltd., W.A. Hubacheck Consultants Ltd. mapped, conducted magnetometer and UT electromagnetic surveys and drilled 3 990 m in the Meadowbank River area (58) on claims held by Asamera Minerals Inc. and Comaplex Minerals Corp. W.A. Hubacheck Consultants Ltd. also staked eight claims in prospecting permits 1170 and 1171 (59), southwest of Ennadai Lake on behalf of Lucky Eagle Mines.

Noranda Exploration Co. Ltd. conducted reconnaissance exploration in Keewatin District and staked two claims north of Watterson Lake (60).

Norstrat Exploration Inc. staked three claims south of Kinga Lake (61).

Placer Dome Inc., as part of an option agreement with MH Resources Inc. (a consortium of Dejour Mines Ltd., Noble Peak Resources Ltd. and private investors), mapped, prospected and carried out reconnaissance work on the TURQ, JOYCE and SPI claims (61) at Turquetil Lake and on the MAG, PAD and CAR claims (61) in the Heninga Lake to Carr Lake areas.

Placer Dome, as part of an option agreement with Noble Peak Resources Ltd., mapped, prospected and evaluated the MG and MJ claims (62) of the Southwin Project between Kaminak Lake and Quartzite Lake.

Suncor Inc. Resources Group and Comaplex Minerals Corp. conducted geological mapping, trenching, lithogeochemistry, magnetometer and VLF electromagnetic surveys on prospecting permits 1229-1232 and claims in the Hawk Hill-Griffin Lake area (63).

Urangesellschaft (Canada) Ltd. in conjunction with PNC Exploration (Canada) Co. Ltd. and Daewoo Corp., performed VLF electromagnetic, resistivity and magnetometer surveys on leases, claims and prospecting permits in the Judge Sissons Lake-Schultz Lake South area (64). Approximately 10 900 m of drilling were completed on uranium targets. A new prospecting permit (PP 1264) located to the south was prospected, and 23 new claims were staked, namely in prospecting permit areas PP 1161-1163 and 1264.

Arctic Islands

Comaplex Resources International Ltd. and Agnico Eagle Mines Ltd. conducted lithogeochemical surveys in areas underlain by sulphide-bearing schists and rusty iron formation of the Archean Piling Group in Central Baffin Island. Work was concentrated in four prospecting permits near Dewar Lake (65) and eight prospecting permits near Flint Lake (66).

Cominco Ltd. completed 10 holes totalling 2 700 m and induced polarization surveys on eastern Truro Island (67), near its Polaris mine on Little Cornwallis Island. Cominco also conducted airborne VLF electromagnetic surveys on its holdings in the Cornwallis Lead-Zinc District and mapped and surveyed claims on Cornwallis Island (b).

Nanisivik Mines Ltd. drilled in the Oceanview area and DEB claims, northeast and southwest respectively of its Nanisivik mine (c). The company also gridded, surveyed and drilled Mississippi-Valley-type zinc-lead targets in Proterozoic carbonates at Hawker Creek (68) and three areas on prospecting permits near Surprise Creek (69). At Mary River (70) the company drilled six holes totalling 500 m in volcanogenic sulphide targets to test for copper, lead, zinc and precious metals. Gridding, geological mapping and geophysical surveys were conducted on prospecting permits near Ege Bay and Grant Suttie Bay (71).

Noranda Exploration Co. Ltd., on behalf of joint venture partners Highwood Resources Ltd. and Aber Resources Ltd., conducted airborne magnetometer and electromagnetic surveys, ground geophysical surveys, geological mapping and prospecting on 12 contiguous prospecting permits and claims in Proterozoic sediments near Hadley Bay, northeastern Victoria Island (72). The company drilled 19 holes totalling approximately 2 400 m to test copper-silver prospects in the sediments.

Table 8:
Placer Mining, Mines and Mining Exploration Projects, Yukon, 1991

Location	N.T.S.	Property/CLAIM(S)	Company/Area
1	115 O	Indian River	Placer mining area
2	115N, O	Klondike	Placer mining area
	116 B, C	Klondike	Placer mining area
3	116 B, C	Sixty Mile, Forty Mile Rivers	Placer mining area
4	115 N, O	Lower Stewart River	Placer mining area
5	105 M	Mayo	Placer mining area
6	115 P	Clear Creek	Placer mining area
7	115 I	Dawson Range	Placer mining area
8	105 E	Livingstone Creek	Placer mining area
9	106 D	BLLENDE	Billiton Metals; NDU Resources
10	105 L	CLEAR LAKE	Total Energold; Mitsui Kinzoku
11	105 O	TOM	Cominco
12	105 O	NIDD	Cominco
13	105 O	JASON	Phelps Dodge
14	115 I	REVENUE-NUCLEUS	Big Creek Resources
15	105 B	DAN (BAR)	First Yukon Resources
16	105 G	KONA (FYRE LAKE)	Placer Dome
17	106 D	CARPENTER RIDGE	Big Creek Resources
18	115 K	AZ	Noranda
19	105 H	MATT BERRY (BARB)	Pulse Resources
20	116 B	BREWERY CREEK	Loki Gold; Hemlo Gold
21	106 D	SCHEELITE DOME and HAGGART CREEK	Amax Gold
22	115 I	GOULTER	Aurchem
23	105 J	ITSI	Noranda
24	105 F	SEAGULL CK (TAY-LP)	Pacific Comox
25	115 P	JOSEPHINE	Noranda
26	116 A	BEAR	Noranda
27	116 B	LONESTAR	Arbor Resources
a	105 K	FARO AND VANGORDA MINES	Curragh Resources
b	105 A	SA DENA HES MINE	Curragh Resources and Hillsborough Resources
c	105 C	MARLIN	Anooraq Resources
d	105 H	KING ARCTIC JADE	Max Rosequist

Table 9:
Mines and Mining Exploration Properties, Northwest Territories, 1991

Location	N.T.S.	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company
1	77 A	Wombat (Granite) prospect	GSA Management; Gold Corp. Investment
2	76O	BOSTON, KAMIK	BHP-Utah
3	77 M	SANTIAGO AND MADRID	BHP-Utah
4	76 O	HAVANNA	BHP-Utah
5	76 L	ULU, CROWN, DEN-FIDO	BHP-Utah
6	76M	BAMAKO-PARIS, BRAVO	BHP-Utah
7	76 L	HOTEL, SPARK	BHP-Utah
8	76 M	CAIRO AND ROMA, CYGNET	BHP-Utah
9	76 M	HIGH	Kennco Expl.
10	76 M	ARNICA, P.P. 1181	BHP-Utah
11	86 P	P.P. 1285	BHP-Utah
12	76 K	LUI	Cogema
13	76 N	MARC	Cogema
14, 15, 16	76 J	Tinney Hills-Hiukitak River area	Cogema
17	76 K	TAK	BHP-Utah
18	76 G	George Lake area, BRAU	Homestake; Kerr-McGee
19	76 G	Boot Lake area	Homestake; Kerr-McGee
20	76 F,G	PXD-FEG-BEB	Echo Bay
21	76 G	BUCK-NUTS	Echo Bay
22	76 E	COCO	Cominco; Cogema
23	76 E	LST	Cominco
e	76 E	PXD 2, FIN	Echo Bay
24	76 E	AU	Cogema
25	76 E	IF 3, IF 4	Contwoyto Goldfields
26	86 H	P	Royal Oak
27	76 C,D	A,B,C,D,E,F,T,M,W	Dia-Met; BHP-Utah
d	56 B	COLOMAC MINE LEASE, ED1	Northwest Gold
28	85 O	CHARLES, MARY	Robert Curtis
29	85 O	ROBIN-NATASHA YELLER-IRON	Fortune Minerals
30	75 M	COTTONGRASS	BHP-Utah
31	85 I	SHEET	Nanisivik
32	85 I	VIC	Nerco Minerals
33	85 P	Nicholas Lake	Athabaska; Royal Oak
34	85 J	TOM and PTARMIGAN MINES	Treminco Resources
35	85 I	DAF	Knut Rasmussen
36	85 J	MON	Ger-Mac Expl.
37	85 J	MARLIN, HOPE	Golden Marlin Resources
38	85 J	CON MINE LEASE	Nerco Minerals
39	85 J	G	Royal Oak
40	85 J	KAM	Treminco Resources

Table 9: (Continued)
Mines and Mining Exploration Properties, Northwest Territories, 1991

Location	N.T.S.	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company
41	86 C	DV	Aber Resources
41	86 B	NOR-SP-A1	Cominco
42	86 F	POINT	Aber Resources
43	86 F	P.P. 1246-1247	Cominco
44	86 F	P.P. 1244	Cominco
45	86 O	CU 1-20	Cominco
46	86 O,N	MAT 1-24	Noranda
47	86 K	SCANDIUM	Norman Hennel
48	85 K,L	Horn Plateau	B.P. Resources
49	85 K,F	Racoon Lake, Mink Lake	Cominco
50	85 J	Chedabucto Lake	Cominco
51	75 I	BOOM 1,2	PNC Expl.
52	55 J,K,N,O	NAT	Asamera; Comaplex
53	55 N	P.P. 1282-1284	Asamera; Comaplex
53	55 N	P.P. 1265	Kaminak Resources
54	55 K	TAV	Comaplex
55	55 M	P.P. 1272-1275, 1278-1279	Comaplex
56	65 C	P.P. 1276, 1277, 1280, 1281	Comaplex
57	65 G	P.P. 1233-1237, 1251	Comaplex
58	66 H	Meadowbank River	Lucky Eagle; Agnico Eagle; Hecla
59	65 C,D	P.P. 1170, 1171	Lucky Eagle
60	65 G	Watterson Lake	Noranda
61	55,E,L; 65 H,I	TURQ, JOYCE, SPI	Placer Dome
61	55 L; 65 H,I	MAG, PAD, CAR	Placer Dome
61	65 H	Kinga Lake	Norstrat
62	55 L	MG, MJ	Placer Dome
63	65 G	P.P. 1229-1232	Suncor; Comaplex
64	66 A,B	Judge Sissons-Schultz lakes	Urangesellschaft; P.N.C.; Daewoo
65	27 B; 37 A	Dewar Lake	Comaplex; Agnico Eagle
66	37 D	Flint Lake	Comaplex, Agnico Eagle
67	68 H	Truro Island	Cominco
b	68 H	POLARIS MINE	Cominco
c	48 C	Oceanview, DEB	Nanisivik
c	48 C	NANISIVIK MINE	Nanisivik
68	48 A	Hawker Creek	Nanisivik
69	48 A,B	Surprise Creek	Nanisivik
70	37 G	Mary River	Nanisivik
71	37 C	Ege and Grant Suttie bays	Nanisivik
72	77 G; 86 B	Hadley Bay	Noranda

APPENDIX

The Mining Industry in Canada's Northern Territories

Introduction

The North is that 40 per cent of Canada is occupied by Yukon and the Northwest Territories. It covers an area of 3.86 million square kilometres with dimensions from east to west of 3 500 km and from north to south of 2 500 km.

Mining was established as a founding industrial-age economic activity in the North. It is now the leading industrial sector, accounting for over 30 per cent of the value of goods and services produced in the North. The industry directly employs approximately eight per cent of the employed work force. Mining's linkages to the transportation, electrical, construction and various service sectors are especially significant to the North's economy.

The population of the North in mid-1991 was 82 000 people. During the same year, the value of metals and construction material mined amounted to \$890 million or more than \$10 000 for every northern inhabitant. Petroleum and natural gas production, during 1991 in the Northwest Territories, accounted for an additional \$209 million. A substantial portion of the factor inputs consumed in the production of the hard minerals and metals are either imported from regions south of the 60° latitude or are generated in the North as added value. The added value is derived from such inputs as labour, energy and services. The imported inputs include capital equipment such as shovels and trucks. The value of mineral production also includes the cost of shipping the mineral products or metal to markets and the cost of smelting and refining of mineral concentrates and gold bullion.

Geological Heritage

The landscape of the northern regions is derived from its long and rich geological history. The oldest identified rock in the Northwest Territories lies in the Precambrian Shield. It is 3.962 billion years old, among the oldest rocks of the world. The Precambrian Shield, north of 60° latitude, extends eastward from Great Bear Lake and Great Slave Lake to Hudson Bay and on to Baffin and Ellesmere islands. The igneous, metamorphic and sedimentary rocks of the Shield range in age from more than three billion to less than one billion years. The

marine sediments in the youngest of these rocks contain the earliest fossil records of marine life.

The stratigraphic record extends from this late Precambrian era, as represented by Proterozoic sediments, nearly a billion years old, to the Quaternary glacial sediments, some 10 000 to several thousand years old. The sedimentary rock formations and glacial deposits faithfully record their depositional environment. Their fossil record and stratigraphic characteristics are used to correlate rocks across distances of hundreds of miles and to determine the probable age of the sediments.

The last continental ice sheet retreated from the Northwest Territories and Yukon several thousand years ago, leaving an extensive glacial landscape. Post-glacial sediments form modern land forms, such as river deltas. It played a major role in the North's mineral development. Glaciation exposed some of the primary mineral deposits in the shield areas by removing the soil cover. Other mineral deposits are covered by extensive glacial deposits and can only be found by employing geophysical surveys followed by drilling of the geophysical targets.

Recently a diamond-bearing kimberlite pipe was located near Lac de Gras, north of Yellowknife, Northwest Territories, by localizing the source area of the kimberlite rock mineral constituents that had been transported by glaciers during the Pleistocene age and deposited in sand and gravel esker ridges.

Some parts of the North, such as the famous Klondike area, near Dawson, Yukon, were not glaciated during the last ice age. The deep weathering of rocks in the early Tertiary period, 26 to 53 million years ago combined with an uplift of the land area in the late Tertiary, less than 26 million years ago, led to the concentration of rich gold deposits in downcutting streams, within gravel deposits in deep narrow canyons. Beyond the limits of the non-glaciated area in Yukon, glaciation either destroyed or covered many of these gold deposits. Some of the deposits have been found in deep canyons, where the gold-bearing gravels are overlain by glacial sand, gravel and clay deposits that appear higher on the banks of the stream valley.

History of the Earliest Mining

Before European explorers arrived in the North, the indigenous peoples, the Inuit and Indian people, mined and traded native copper derived from the Coppermine and Bathurst Inlet areas of the Northwest Territories and the White River area, Yukon, near the Yukon Alaska border.

In the Northwest Territories, the first European mining took place more than four centuries ago (1577-1578) when Sir Martin Frobisher mined and shipped some 2 000 tonnes of so-called "black stone" from the now famous "gold" mine on Kodlunarn Island, on the east side of Frobisher Bay, southern Baffin Island region. The pits were rediscovered 300 years later by C.F. Hall. The worthless barren rock taken to England by Frobisher was believed to contain gold according to the alchemists, but neither the existing pits nor museum samples of the black stone in England contain gold. Nonetheless, Frobisher has the distinction of being the chronicler of the first attempt to mine gold in the North. While in search of China via the Northwest Passage, Frobisher also formed the first northern mining company called, "a Company of Cathay", under charter from Queen-Elizabeth I.

In 1771, Samuel Hearne, a clerk with the Hudson's Bay Company and his remarkable Indian guide, Matonabee, set out from Churchill on Hudson Bay. It was Hearne's third attempt to locate the legendary mountain of copper in the Coppermine River area. Hearne's party wandered 8 000 km on a year-and-a-half journey, mostly on foot, to find what he described as "no more than an entire jumble of rocks and gravel" at Coppermine Mountain, near the Coppermine River. The copper occurrences and small pieces of native copper float seen by Hearne were of little commercial interest to the Hudson's Bay Company. These showings were later mentioned by a number of explorers who passed through the region and in 1966, the area was the object of a large staking rush and intensive exploration activity. None of the several copper deposits that were outlined during this period were commercially feasible because of the remoteness of the region.

The mineral industry in the North gained a permanent foothold in 1896 when the news of the Klondike gold discovery in Yukon first reached the outside world. The discovery, near Dawson, Yukon, was made by George Carmack, Skookum Jim and Tagish Charlie on Rabbit Creek which was later renamed Bonanza Creek. By the summer of 1898, over 40 000 stampederers had reached the gold field, and by the turn of the century, the Klondike was established as one of the great placer gold fields of the world. Currently, some 194 placer operations with 700 people mine gold on a seasonal basis.

In the Northwest Territories, the mining industry did not become established until 1930 when Gilbert A. LaBine and E. Charles St. Paul staked a cobalt-silver-uranium-bearing vein on McTavish Arm on the east side of Great Bear Lake. This property became the Eldorado mine, which operated as a radium-silver mine between 1933 and 1940, as a uranium mine between 1942 and 1960 and as a silver mine between 1964 and 1982.

The Yellowknife gold camp became firmly established in 1938, when the Consolidated Mining and Smelting Company Ltd. (now Cominco Ltd.) started production at the Con mine. Yellowknife's second gold mine, the Giant mine, entered production in 1948. Except for a period between 1943 and 1946 when the Con mine was closed, both the Con and Giant mines have remained in continuous production since their start.

**TABLE 10:
Mineral Production, Yukon,
1982-1991**

Mineral		1982	1983	1984	1985	1986	1987	1988	1989	1990(R)	1991(P)
Gold	%	39 721 000	50 337 000	44 419 000	42 669 000	58 237 000	88 970 000	87 386 000	80 070 000	66 731 000	67 097 000
	kg	2 656	3 006	2 960	3 065	3 547	4 674	5 052	5 652	4 639	5 034
Silver	\$	29 943 000	6 891 000	18 825 000	13 098 000	18 468 000	40 965 000	42 593 000	14 851 000	15 177 000	12 856 000
	kg	95 000	15 000	54 000	47 000	73 000	133 000	159 000	71 000	84 000	86 000
Lead	\$	25 733 000	307 000	1 539 000	848 000	23 893 000	105 982 000	118 696 000	98 310 000	124 704 000	81 036 000
	kg	35 493 000	520 000	2 083 000	1 470 000	35 091 000	100 267 000	117 058 000	94 529 000	104 181 000	95 224 000
Copper	\$	14 654 000	3 977 000		19 000	13 000	22 000				
	kg	7 510 000	1 904 000		10 000	6 000	9 000				
Zinc	\$	58 519 000	31 000	244 000	137 000	61 521 000	187 336 000	237 932 000	332 934 000	325 366 000	178 340 000
	kg	54 537 000	27 000	173 000	109 000	50 634 000	147 045 000	143 939 000	154 709 000	168 846 000	142 558 000
Antimony	\$								11 000	3 000	4 000
	kg								4 000	1 000	2 000
Bismuth	\$			2 000	11 000	5 000	2 000	2 000	12 000		
	kg			162	1 000	541			1 000		
Cadmium	\$		6 000	9 000	5 000	8 000	13 000	62 000	8 000		
	kg		2 000	2 000	1 000	2 000	2 000	3 000	1 000		
Sand and Gravel	\$	550 000	1 438 000	5 105 000	2 995 000	13 355 000	1 502 000	5 184 000	5 675 000	9 833 000	6 883 000
	t	463 000	480 000	3 074 000	1 185 000	4 902 000	352 000	2 246 000	2 367 000	2 113 000	1 542 000
Sulphur (smelter gas)	\$				267 000	1 000	156 000	183 000	39 000		
	t				2 000	7	1 000	2 000	N/A		
Coal (E)	\$	368 000				209 000	440 000	100 000	420 000		
	t	20 860				17 223	20 000	10 000	40 000		
Stone	\$						679 000				
	t						206 000				
TOTAL	\$	169 120 000	62 987 000	70 143 000	60 069 000	176 310 000	426 027 000	492 299 000	532 330 000	541 814 000	346 216 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.
(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential, (N/A) Not available

TABLE 11:
Mineral Production, Northwest Territories,
1982-1991

Mineral		1982	1983	1984	1985	1986	1987	1988	1989	1990(R)	1991(P)
Gold	\$	91 415 000	144 570 000	191 071 000	177 079 000	205 266 000	223 456 000	205 503 000	177 260 000	223 788 000	220 742 000
	kg	6 113	8 634	12 732	12 713	12 503	11 740	11 880	12 208	15 557	16 562
Silver	\$	16 073 000	33 743 000	20 361 000	9 083 000	5 478 000	4 006 000	6 923 000	3 820 000	3 457 000	2 876 000
	kg	51 000	74 000	59 000	33 000	22 000	13 000	26 000	18 000	19 000	19 000
Copper	\$	419 000	214 000	130 000	46 000	1 000	4 000	3 000			
	kg	215 000	102 000	69 000	23 000	1 000	2 000	1 000			
Lead	\$	46 367 000	47 981 000	66 647 000	44 489 000	91 129 000	139 370 000	52 223 000	41 323 000	55 766 000	26 724 000
	kg	63 955 000	81 161 000	90 198 000	77 083 000	133 836 000	131 744 000	51 502 000	39 734 000	46 588 000	31 403 000
Zinc	\$	229 110 000	269 951 000	386 813 000	356 415 000	322 064 000	328 781 000	537 756 000	708 009 000	420 550 000	270 002 000
	kg	213 523 000	234 883 000	274 920 000	284 223 000	265 073 000	258 070 000	325 321 000	329 001 000	218 241 000	223 024 000
Cadmium	\$		10 000	1 034 000	866 000	670 000	501 000	3 172 000	4 405 000	266 000	
	kg		3 000	214 000	238 000	175 000	86 000	166 000	269 000	31 000	
Bismuth	\$		163 000	34 000	60 000						
	kg		32 000	3 000	3 000						
Antimony	\$						141 000	55 000	43 000	6 000	
	kg						44 000	19 000	18 000	3 000	
Tungsten Trioxide (E)	\$	38 353 000	11 221 000	33 584 000	38 918 000	17 363 000					
	kg	2 925 000	1 126 000	3 112 000	3 529 000	2 470 000					
Arsenious Trioxide (E)	\$	3 862 000	2 345 000	5 837 000	1 969 000	254 000	666 000	2 366 000	1 286 000	240 000	247 000
	t	1 780	982	4 684	4 098	406	X	X	X	X	X
Sulphur (smelter gas)	\$				11 665 000	21 788 000	6 912 000	7 286 000	8 468 000	2 677 000	3 195 000
	t			98 000	147 000	59 000	6 000	73 000	67 000	17 000	20 000
Sand and Gravel	\$	41 482 000	32 479 000	36 323 000	8 981 000	3 281 000	8 132 000	10 966 000	11 813 000	13 856 000	8 160 000
	t	6 625 000	5 905 000	7 249 000	6 803 000	986 000	2 183 000	2 443 000	2 203 000	3 274 000	1 853 000
Stone	\$	1 268 000	14 601 000	4 617 000	434 000	1 011 000	1 486 000	232 000	4 344 000	9 079 000	3 735 000
	t	323 000	2 409 000	729 000	163 000	368 000	472 000	108 000	727 000	1 495 000	508 000
TOTAL	\$	468 349 000	557 198 000	746 451 000	649 732 000	668 452 000	713 310 000	826 487 000	960 771 000	729 675 000	544 681 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.

(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential



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INTRODUCTION

This report covers the activities of the mines and minerals sector of Yukon and the Northwest Territories during the calendar year 1992.

The report was compiled by D.D. Brown of the Mineral Resources Directorate of the Department of Indian Affairs and Northern Development (DIAND), Ottawa. The mineral exploration sections are based on the 1992 mining exploration overviews produced by DIAND regional staff under the direction of S.R. Morison, Chief Geologist, Northern Affairs Program in Yukon Region and W.A. Padgham, Manager, Geology Division, Northern Affairs Program in the Northwest Territories Region.

SUMMARY

Yukon

The value of minerals produced in Yukon was estimated at \$467.9 million in 1992 compared with \$340.7 million in 1990. The only hard rock mining operations in 1992 were Curragh Inc.'s Faro and Vangorda zinc-lead-silver mines, in the Faro area and the Sa Dena Hes zinc-lead-silver mine, in the Watson Lake area. The Sa Dena Hes mine is jointly owned by Curragh Inc. and Hillsborough Resources Ltd. In December 1992, Curragh Inc. suspended its mining operations in the Faro area and at the Sa Dena Hes mine because of high inventories and low zinc and lead prices. The zinc and lead production of these mines represented 84 percent of the total value of mineral production in Yukon during 1992.

Placer gold production reported for royalty payments in 1992 declined by 10 percent from the previous year to reach 3,143.3 kg of crude gold. Some 185 placer operations were active in 1992 compared with 219 in 1991. Gold from placer operations and some by-product gold from the hard rock mines accounted for 11 percent of the value of Yukon's mineral production.

Exploration expenditures in 1992 showed a 38 percent drop to about \$10 million, from \$16 million the previous year. Much of the 1992 expenditures was focused on the delineation of porphyry copper deposits on the Williams Creek and Casino properties in the Dawson range and the delineation of bulk-tonnage, low-grade gold deposits on the Brewery Creek property, near Dawson, and the Dublin Gulch property, near Mayo.

Northwest Territories

The value of minerals produced in the Northwest Territories was estimated at \$482.9 million in 1992 compared with \$489.1 million in 1991. Mineral production was derived from four gold mines and two zinc-lead mines. Gold accounted for 39 percent of the mineral production value and zinc-lead accounted for 60 percent.

During 1992, the 10th anniversary of production was celebrated at both Cominco Ltd.'s Polaris zinc-lead mine, on Little Cornwallis Island and at Echo Bay Mines Ltd.'s Lupin gold mine near Contwoyto Lake. A bitter labour strike began in May 1992 at Royal Oak Mines Inc.'s Giant gold mine, near Yellowknife. Although the strike continued through the remainder of the year and 240 unionized employees were locked out, production was maintained with the assistance of contract replacement miners and non-striking union workers.

In 1992, exploration expenditures in the Northwest Territories were expected to exceed \$36 million, compared with approximately \$36 million in the previous year. Extensive staking during the year covered a record 7.18 million hectares (ha). Most of the staking, some 7 million ha, took place in Slave Structural Province, where the discovery of the Point Lake diamondiferous kimberlite pipe, near Lac de Gras, sparked a staking rush in fall 1991 that continued through 1992. Several major companies and a number of junior mining companies explored for diamonds by conducting soil sampling for kimberlite indicator minerals, contracting airborne geophysical surveys, and drilling. At least 20 drill holes in three drill programs tested targets to identify and sample kimberlite pipes.

During 1992, the exploration effort in the Lac de Gras area was rewarded by the discovery of at least 16 (and more likely 18) new kimberlite pipes; 10 of these were reported to be diamondiferous. BHP Minerals Canada Ltd. and Dia Met Minerals Ltd. announced that a 160 t bulk drill cuttings sample taken from the Point Lake pipe, yielded 101 carats of diamonds. Gem quality stones made up 25 percent of the parcel. Some of these stones were in the one to three carat range. In 1993, the joint venture intends to bulk test, at least two of the nine diamondiferous kimberlite pipes identified during 1992 drilling.

A large number of magnetic and electromagnetic (EM) anomalies were identified by airborne geophysical surveys conducted in central Slave Structural Province during 1992. The anomalies provide more than 150 untested drill targets for kimberlite pipes. Among these, SouthernEra Resources Ltd. reported that 40 high priority targets had been identified on properties where SouthernEra has an interest. Accordingly, it is expected that more kimberlite pipes will be located by drilling in the Lac de Gras area and surrounding region in 1993.

Exploration for polymetallic massive sulphide deposits in the northern half of Slave Structural Province recommenced after a 10-year hiatus. Minnova Inc. and Metall Mining Corporation completed a large exploration program on the Izok (Izok Lake) copper-zinc property in an effort to assemble the mine reserve data required for a final feasibility study. The joint venture also evaluated the infrastructure requirements for mine production, including a 265 km-winter road to Coronation Gulf, a port facility on Coronation Gulf, and a marine shipping capability to transport 400,000 t of concentrate annually from Coronation Gulf to overseas markets.

SOMMAIRE

Yukon

La valeur des minéraux extraits au Yukon a été évaluée à 467,9 millions de dollars en 1992, comparativement 340,7 millions de dollars en 1990. L'exploitation de mines métalliques en 1992 s'est limitée aux mines de zinc, d'argent et de plomb Faro et Vangorda, situées dans la région de Faro, appartenant à Curragh Inc. ainsi qu'à la mine Sa Dena Hes, dans la région de Watson Lake. La mine Sa Dena Hes appartient à Curragh Inc. et à Hillsborough Resources Ltd. En décembre 1992, Curragh Inc. a dû suspendre ses opérations en raison de ses stocks élevés et de la faiblesse des prix du zinc et du plomb. Le zinc et le plomb provenant de ces mines représentaient 84 p. 100 de la valeur totale de la production minérale au Yukon en 1992.

La production de placers déclarée aux fins du paiement des redevances en 1992 a baissé de 10 p. 100 par rapport à l'année précédente pour tomber à 3143,3 kg d'or brut. Quelque 185 travaux d'exploitation des placers étaient en cours en 1992, contre 219 en 1991. L'or provenant de placers et l'or récupéré comme sous-produit des mines métalliques comptaient pour 11 p. 100 de la valeur de la production minérale du Yukon.

En 1992, les dépenses liées à la prospection ont accusé une baisse de 38 p. 100; elles sont passées de 16 millions de dollars l'année précédente à 10 millions de dollars en 1992. La plupart des dépenses ont été centrées sur la délimitation des gisements de porphyre cuprifère dans les concessions de Williams Creek et de Casino, dans le rang Dawson, et des gisements d'or pauvre calculés en tonnage global dans la concession de Brewery Creek, près de Dawson et dans la concession de Dublin Gulch, près de Mayo.

Territoires du Nord-Ouest

La valeur des minéraux extraits dans les Territoires du Nord-Ouest était de 482,9 millions de dollars en 1992, comparativement à 489,1 millions de dollars en 1991. La production minérale provenait de quatre mines d'or et de deux mines de zinc et de plomb. La production d'or représentait 39 p. 100 de la production minérale et la production de zinc et de plomb en représentait 60 p. 100.

En 1992, on a célébré le 10^e anniversaire de la mise en production de la mine de zinc et de plomb Polaris exploitée par Cominco Ltd., située sur la Little Cornwallis Island, et de la mine d'or Lupin exploitée par Echo Bay Mines, près de Contwoyto Lake. Une grève a commencé en mai 1992 à la mine d'or Giant exploitée par Royal Oak Mines Inc., près de Yellowknife. Bien que la grève se soit poursuivie toute l'année et qu'elle ait donné lieu à un lock-out de 240 employés syndiqués, la production a été maintenue avec l'aide de miniers contractuels et de syndiqués non grévistes.

En 1992, les dépenses liées à la prospection dans les Territoires du Nord-Ouest s'élevaient à 38,1 millions de dollars, comparativement à 29,6 millions de dollars l'année précédente. Le jalonnement des concessions s'est poursuivi à fond de train sur une superficie de 7,18 millions d'hectares (ha). La plupart des concessions, couvrant une superficie de quelque 7 millions d'ha, se trouvent dans la province structurale des Esclaves, où la découverte d'une veine de kimberlite diamantifère à Point Lake, près du Lac de Gras, a provoqué une ruée qui a commencé à l'automne 1991 et s'est poursuivie en 1992. Plusieurs grandes compagnies et nombre de nouvelles compagnies minières ont prospecté pour le diamant. Elles ont prélevé des échantillons de sol pour des indices de kimberlite, ont effectué des levées géophysiques aériennes et des forages. Au moins 20 trous ont été forés dans le cadre de trois programmes de forage; des veines de kimberlite ont été délimitées et des échantillons prélevés. En 1992, les efforts de prospection dans la région du Lac de Gras ont été récompensés par la découverte d'au moins 16 (plus probablement 18) nouvelles veines de kimberlite dont 10 sont diamantifères. La BHP Minerals Canada Ltd. et la Dia Met Minerals Ltd. ont annoncé qu'un échantillon de 160 t de débris de forage extrait de la veine de Point Lake renfermait 101 carats de diamants. Vingt-cinq pourcent de la parcelle recelait des pierres gemmes dont certaines faisaient de un à trois carats. Les participants à cette coentreprise ont l'intention de faire, en 1993, des tests globaux sur au moins deux des neuf veines de kimberlite diamantifère qu'ils ont décelées lors des travaux de forage en 1992.

Un grand nombre d'anomalies magnétiques et électromagnétiques ont été détectées grâce à des levées géophysiques aériennes faites au centre de la province structurale des Esclaves en 1992. Les anomalies indiquent 150 zones non testées pouvant renfermer des veines de kimberlite. La SouthernEra Resources Ltd. a déclaré que 40 d'entre elles étaient prioritaires et qu'elles avaient été repérées dans des concessions appartenant en partie à la SouthernEra. Par conséquent, on s'attend à trouver, en 1993, plus de veines de kimberlite en forant dans la région du Lac de Gras et les environs.

La prospection des gisements de sulfures massifs polymétalliques dans la moitié nord de la province structurale des Esclaves a repris après dix ans d'interruption. La Minnova Inc. et la Metall Mining Corp. ont mené un vaste programme de prospection dans la concession de cuivre et de zinc d'Izok (Izok Lake) afin de rassembler les données sur les réserves pour l'étude de faisabilité finale. Les participants à l'entreprise ont également évalué les besoins en infrastructure pour l'exploitation minière, lesquels comprennent une route pour l'hiver de 265 km se rendant à la baie du Couronnement, des installations portuaires dans cette dernière et un navire de chargement capable de transporter chaque année 400 000 t de concentré de minerai à partir de la baie du Couronnement jusqu'aux marchés d'outremer.

Yukon

Mineral Production

The value of mineral production in Yukon during 1992 was estimated at \$467.9 million compared with \$340.7 million the previous year. The only hard rock mining operations in 1992 occurred at Curragh Inc.'s Faro and Vangorda mines in the Faro area and the Sa Dena Hes mine in the Watson Lake area, that is jointly owned by Curragh Inc. and Hillsborough Resources Ltd. (Map 1). Because of the depletion of open-pit ore, Curragh ceased mining in the Faro mine pit on May 1992 and the underground operation accessed from the pit closed in October, 1992. Curragh continued mining at its Vangorda mine and Sa Dena Hes mine until December, 1992, when the operations were suspended because of depressed zinc and lead prices and a large inventory of zinc and lead concentrates. Production of zinc and lead during 1992 was substantially higher than during the previous year. The Faro mill continued to process stockpiled ore during the first quarter of 1993.

Gold production from Yukon's placer mine operations continued to be second in value only to the zinc-lead-silver production from the hard rock mines. Placer gold production reported by royalty payments in 1992 declined 10 percent from the previous year to reach 3,143.3 kg of crude gold.

Exploration expenditures in 1992 dropped 38 percent to about \$10 million from \$16 million in the previous year. Much of the 1992 exploration expenditures was focused on several advanced projects. These include the Casino and Williams Creek porphyry copper deposits in the Dawson Range, northwest of Carmacks and two bulk-tonnage, low-grade gold properties - namely, the Brewery Creek property, near Dawson City and the Dublin Gulch property, north of Mayo.

Yukon's hard rock mining operations, occurring in the Faro, Vangorda and Sa Dena Hes mines, employed 395 people in early December 1992 and 131 at year end 1992. Yukon's placer mine operations employed an estimated 650 people during the placer mining season.

Yukon accounted for 17.5 percent of the zinc, 39.5 percent of the lead and 2.4 percent of the gold produced in Canada during 1992. Yukon's 1992 metallic mineral production value, \$462.6 million, amounted to 4.5 percent of the total value of Canada's 1992 metallic mineral production. This compares with 3.2 percent in 1991.

Mineral production statistics for Yukon for 1983-1991 are given in Table 11.

Mines

Curragh Inc., Faro and Vangorda Mines

Curragh Resources Inc. was the leading mine operator in Yukon. In 1992, the Faro mill (a)* produced 503,300 t of zinc and lead concentrate. This compares with 442,810 t of zinc concentrate and lead concentrate produced the previous year. Production was substantially higher in 1992 compared to 1991, when the Faro operation suffered a 10-week strike during the second quarter of 1991.

Mineable reserves were exhausted in the Faro open pit in May 1992, and the underground mining operation accessed from the pit was closed in October 1992. Feed for the Faro mill was supplied from the Vangorda open pit until low metal prices forced a planned shutdown of the mine on December 20, 1992. Development of the Grum ore deposit was suspended in December 1992.

Early in 1993, Curragh Inc. announced that at current metal prices, the company would not generate sufficient cash from operations to fund the expenditures necessary to develop the Grum ore deposit, in the Faro area, for 1993 production. Without ore production from the Grum deposit, concentrate production was expected to cease at the Faro mill in the second quarter of 1993.

Faro Area Mines: Faro and Vangorda Mines

Type:	underground and open pit at Faro, open pit at Vangorda
Location:	Faro mine is 14 km north of Faro and Vangorda mine is 7 km east-northeast of Faro
Product:	zinc, lead, silver, gold
Mill Capacity:	13 500 tpd
Tonnes Milled:	N/A
Ore Reserves:	N/A
Ore Reserve Grade:	N/A
Employees:	190 (December 20, 1992)

N/A: Not available

* Numbers or letters in parenthesis indicate the location of the property on Map 1.

Table 1: Mineral Production of Operating Mines, Yukon, 1990, 1991 and 1992

Company, Mine and Commodity	1990		1991		1992 (P)	
	t	kg	t	kg	t	kg
Curragh Inc.						
Faro and Vangorda Mines						
zinc	151 910		N/A		N/A	
lead	105 510		N/A		N/A	
silver		86 343		N/A		N/A
Curragh Inc. and Hillsborough Resources Ltd.						
Sa Dena Hes Mine						
zinc			N/A		N/A	
lead			N/A		N/A	

Source: Department of Indian Affairs and Northern Development. These figures are reported by the mines as production and will not match Statistics Canada's production figures based on metals sold or shipped.






(P) = Preliminary N/A = Not Available

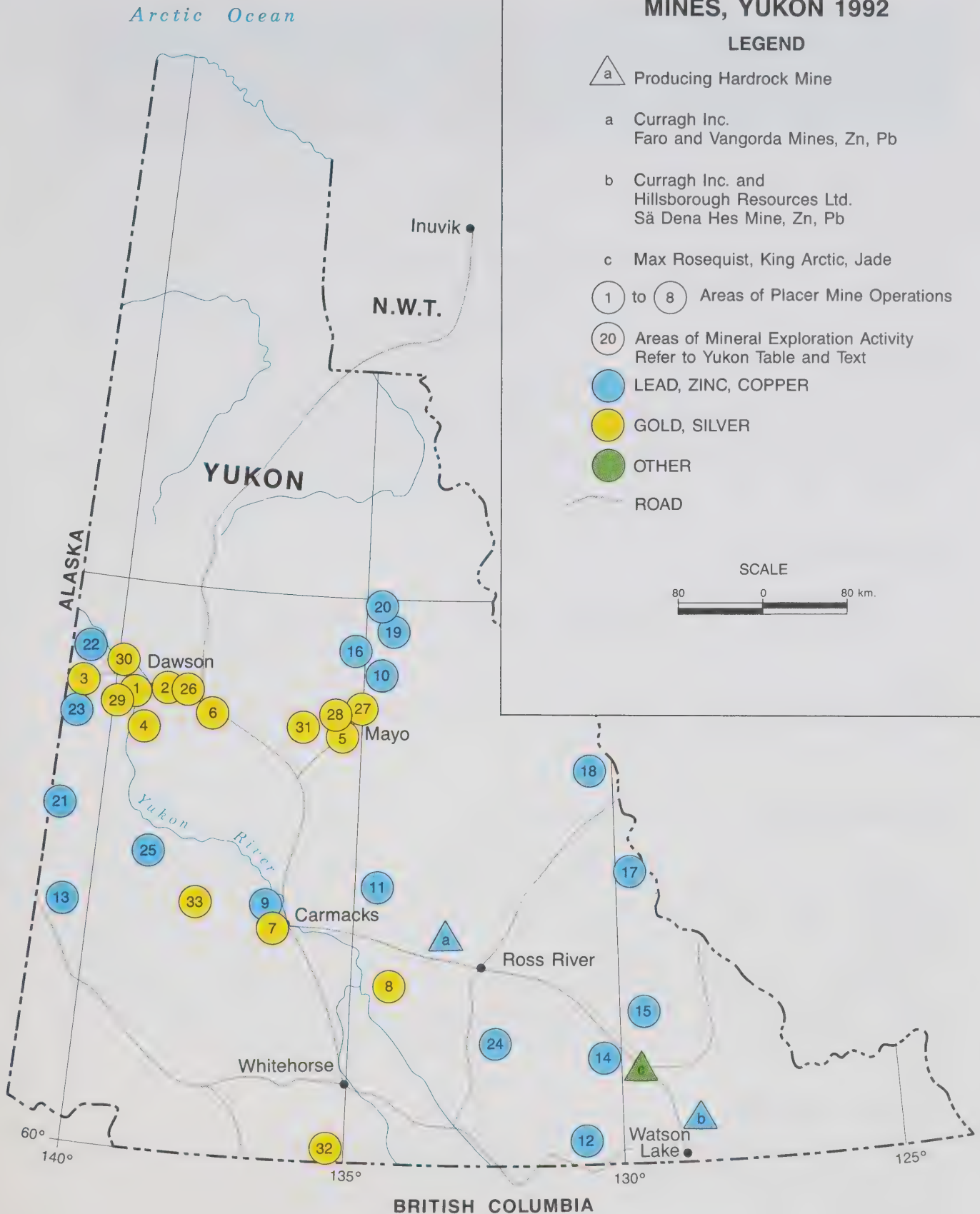
Curragh Inc. and Hillsborough Resources Ltd., Sa Dena Hes Mine

Curragh Inc. owns 89 percent of the Sa Dena Hes zinc-lead mine (b) under a joint venture agreement with Hillsborough Resources Ltd., that owns 11 percent. The \$70-million project near Watson Lake was started in July 1991, when underground production started. The mill started on August 1, 1991. During 1992, the Sa Dena Hes mill produced 127,000 t of zinc and lead concentrate from 527,000 t of ore. This compares with 44,998 t of zinc and lead concentrate produced the previous year. The mine closed on December 2, 1992 because of unprofitable zinc and lead metal prices. All 205 workers and contractors were laid off indefinitely.

MAP 1 MINERAL EXPLORATION AND MINES, YUKON 1992

LEGEND

-  Producing Hardrock Mine
- a Curragh Inc.
Faro and Vangorda Mines, Zn, Pb
- b Curragh Inc. and
Hillsborough Resources Ltd.
Sä Dena Hes Mine, Zn, Pb
- c Max Rosequist, King Arctic, Jade
- (1) to (8) Areas of Placer Mine Operations
- (20) Areas of Mineral Exploration Activity
Refer to Yukon Table and Text
-  LEAD, ZINC, COPPER
-  GOLD, SILVER
-  OTHER
-  ROAD



During the year, Curragh Inc. conducted a large diamond-drill program at the Sa Dena Hes mine by completing 16,460 m in 79 holes.

Type:	underground
Location:	45 km north of Watson Lake
Product:	zinc, lead, silver
Mill Capacity:	1 100 tpd
Tonnes Milled:	527 000 t
Reserves:	N/A
Reserves Grade:	3.24 percent lead, 11.7 percent zinc, 42.3 g of silver per t
Employees:	205 (December 1, 1992)

Seasonal Mine Operations

The KING ARCTIC property (c) continued to produce nephrite jade. It is located in the Frances Lake area, north of Watson Lake. Exploration for and mining of jade is conducted during the summer months. During summer 1992, Max Rosequist, the operator, discovered a record-sized piece of jade conservatively estimated to weigh 577 t.

Placer Mining

Placer gold production, reported by royalty payments in 1992, amounted to 3,143.3 kg of crude gold compared with 3,482.7 kg in 1991. The average price of gold in Canadian dollars was \$395 a troy ounce in 1992 and \$416 a troy ounce in 1991. The lower gold price, declining reserves and a much shorter mining season during 1992, caused by inclement weather, may all have contributed to the continuing decline in production. The 1992 season saw 185 operations (1 to 8), either overburden stripping or sluicing, compared with 219 operations in 1991. In summary, production declined by 10 percent and the number of operations declined by 16 percent.

Advanced Exploration and Development

In the Dawson range, Western Copper Holdings Ltd. (50 percent) and joint venture partner, Thermal Exploration Company (50 percent), completed an extensive exploration program on the WILLIAMS CREEK (9) oxide-copper-gold property. The tabular deposit is oxidized to a depth of 240 m along its 395 m strike length. New reserves to a depth of 197 m in the Main zone, the largest of 13 zones on the property, amount to 10.52 million t grading 1.08 percent copper and 0.34 g of gold per t at a strip ratio of 2.8 to one. The proposed open-pit mine development would use a heap-leach, solvent-extraction process followed by electrowinning to produce copper ingots. The 1992 program included trenching, drilling and engineering studies to assist mine development and environmental permitting.

Mineral Dispositions

Quartz claims in good standing at the end of December 1992, totalled 43,231 compared with 42,268 the previous year. A total of 4,488 new quartz claims were staked in 1992 compared with 4,767 the previous year. A total of 4,882 quartz claims lapsed in 1992 compared with 7,658 in 1991.

**Table 2: Mineral Dispositions Staked and Lapsed, Yukon,
1991 and 1992**

	1992 Calendar Year	1991 Calendar Year
	Staked (Lapsed)	Staked (Lapsed)
Quartz Claims	4 488 (4 882)	4 761 (7 658)
Placer Claims	867 (1 534)	1 197 (1 272)
Placer Leases to Prospect	186 (133)	181 (25)

Source: Department of Indian Affairs and Northern Development.

Table 3: Mineral Dispositions in Good Standing, Yukon, 1991 and 1992

	1992 December 31	1991 December 31
Quartz Claims	43 231	42 268
Placer Claims	17 115	17 801
Placer Leases to Prospect	239	251
Iron and Mica Claims	525	525
Coal Leases and Licences	36	36
Dredging Leases	7	7
Total	61 153	60 888

Source: Department of Indian Affairs and Northern Development.

Geoscience Support

The activities and recent publications of the Exploration and Geological Services Division (EGSD), Northern Affairs Program, DIAND, in Yukon Region are described in *Yukon Exploration and Geology 1992*. This publication may be obtained by writing to S.R. Morison, Chief Geologist, Exploration and Geological Services Division, Northern Affairs Program, DIAND, 200 Range Road, Whitehorse, Yukon, Y1A 3V1.

The Canada-Yukon Economic Development Agreement was signed in May 1991. Under the agreement, the Canada-Yukon Co-operation Agreement on Mineral Development provides for expenditures up to \$9 million from 1991 to 1996. The co-operation agreement allocates the funds as follows: i) Geoscience Program, \$6.3 million; Mineral Technology Program, \$1.8 million; and Public Information on Mining, \$0.9 million. The Energy and Mines Branch, Department of Economic Development, Tourism and Small Business, Government of Yukon, is the prime administrative agency for the co-operation agreement. During 1992, seven geological mapping programs were conducted in Yukon under the Geoscience Program. Twelve projects were funded under the Mineral Technology Program.

Mineral Exploration

Mineral exploration expenditures decreased from \$16 million in 1991 to \$10 million in 1992. Much of the 1992 expenditures supported seven advanced mineral development projects. Two of the largest involved delineation of porphyry copper deposits in the Dawson Range (WILLIAMS CREEK and CASINO) northwest of Carmacks. Two additional projects of similar size and significance, one near Dawson (BREWERY CREEK) and the other north of Mayo (DUBLIN GULCH) (Table 4) involved bulk-tonnage, low-grade gold deposits.

Exploration Projects

Base Metals

Billiton Metals Canada Inc. continued its exploration program on NDU Resources Ltd.'s BLENDE zinc-lead-silver property, northeast of Mayo (10). The program included geophysical surveys and diamond drilling over a 3.3 km strike length. Most of the mineralization is structurally controlled, forming a tabular stockwork and breccia zones in the Middle Proterozoic Gillespie Group dolomite. The Blende deposit is believed to be a Mississippi Valley type deposit (for location, see Map 1).

Drilling on the BLENDE property in 1992 totalled 11,525 m in 62 holes, including 15 holes in the west zone, 34 holes in the east zone and 13 in the centre zone, between the two. The 1992 program significantly increased the geological reserves to approximately 19.4 million t grading 2.81 percent lead, 3.04 percent zinc and 55.88 g of silver per t. These reserves are amenable to open pit mining at a strip ratio of 2.1:1.

Table 4: Exploration Drilling, Yukon, 1992

Project	Company	Diamond Drilling		Percussion Drilling	
		Meters (m)	No. of Holes	Meters (m)	No. of Holes
BREWERY CREEK	Noranda/Loki			1 233	19
WILLIAMS CREEK	WCH/Thermal	3 781	11	2 805	11
DUBLIN GULCH	Amax Gold			5 639	46
CLEAR LAKE	Total Energold/Mitsui Kinzoku	3 100	10		
CLEAR CREEK	Noranda			644	6
BOR	Kennecott	796	5		
SA DENA HES	Curragh	16 460	79		
FIN	Cominco	600	6		
TRAIL HILL	Carmack Gold	623	8		
CASINO	Big Creek Res.	4 572	21		
LONE STAR	Kennecott	1 212	20		

Source: Exploration and Geological Services Division, Department of Indian Affairs and Northern Development, Whitehorse, Yukon.

Total Energold Corporation and Mitsui Kinzoku Resources of Canada Inc. continued exploring the CLEAR LAKE (11) shale-hosted zinc-lead deposit, 80 km northwest of Faro. Drilling in 1978 outlined a massive sulphide body 1,000 m long by 120 m wide containing approximately 30 million t of massive sulphides, including 5.33 million t grading 11.34 percent zinc, 1.99 percent lead and 40.8 g per t of silver. The 1992 exploration program included 3,100 m of diamond drilling, mapping and soil geochemistry. In addition, gravity, induced polarization (IP) and power line magnetotelluric (PLMT) geophysical surveys were completed.

Yukon First Silver Resources continued trenching on its DAN property (12) in the Swift River area, where several showings of massive sphalerite are hosted in Late Paleozoic calc-silicate rocks and felsic tuffs.

Noranda Exploration Co. Ltd. worked briefly on the AZ property (13), on the southwest flank of Humpty Mountain, north of White River. The AZ showing consists of poorly exposed copper-gold skarn mineralization formed in gently dipping limestone.

Under an option agreement with YGC Resources Ltd., Cominco Ltd. mapped and sampled the LYNX, WOLF and FOX claims (14), near the Robert Campbell Highway, north of Watson Lake. Barite and massive sulphide showings occur in intermediate to felsic flows and pyroclastic rocks.

Cominco Ltd. also explored its FIN property (15), where sphalerite and galena occur in carbonaceous, calcareous and pyritic mudstone of the Devono-Mississippian Earn Group. The mineralization was tested by six reconnaissance drill holes averaging 100 m in depth.

Falconbridge Ltd. continued work on the NICK property (16), under option from NDU Resources Ltd. The Nick occurrence consists of a narrow layer of statabound nickel sulphides and zinc-bearing massive sulphides, which occur at the contact between calcareous shale of the Ordovician to Lower Devonian Road River Formation and overlying siliceous turbidic shale of the Devono-Mississippian Earn Group. Work in 1992 consisted of geological mapping and soil sampling.

Falconbridge Ltd. also worked on NDU's FALCON (17) and JET claims (18), located in the Selwyn Basin, approximately 140 km northeast of Ross River. The claims cover nickeliferous horizons in black shale in a similar stratigraphic position as the Nick occurrence described above. Exploration in 1992 consisted of geological mapping and soil sampling.

In the Wernecke Mountains, northwest of Mayo, BHP Minerals Canada Ltd. conducted reconnaissance mapping and lithogeochemical sampling on the BOND (19), IGOR (20) and other properties that were optioned from Archer, Cathro & Associates (1981) Ltd. Mineralized breccias on these properties are hosted by the Middle Proterozoic Wernecke Supergroup and they contain iron oxides, copper, uranium, rare earth elements and gold.

Pamicon Developments Ltd., Equity Engineering Ltd. and Westmin Resources Ltd. also conducted an exploration program directed to targets in the Wernecke Supergroup breccias. The program included staking 12 properties, prospecting, rock geochemistry and limited geological mapping.

Kennecott Canada Inc. financed an exploration program, managed by Archer, Cathro & Associates (1981) Ltd., on the BOR claims (21). The claims are owned by YGC Resources Ltd. The property covers metasedimentary and metavolcanic rocks assigned to the Permian Klondike Schist. Exploration work consisted of 796 m of diamond drilling in five holes, soil sampling and geophysical surveys. The drill holes tested geochemical anomalies and returned low-grade sulphide mineralization.

Kennecott Canada Inc. also financed small exploration programs on the MICKEY (22) and BAL (23) claim groups in search for polymetallic sulphide mineralization. The BAL claims are located near the Yukon-Alaska border and the MICKEY claims are accessible from the Clinton Creek road.

Other base metal exploration programs were conducted by Dromedary Exploration Company Ltd. and Kokanee Explorations Ltd. in the Mayo area, and by Granges Inc. on its MATHEW claims (24) southwest of Ross River.

Big Creek Resources Ltd. drilled 21 large diameter holes on the CASINO property (25), optioned from Casino Silver Mines Ltd. Casino Silver Mines optioned the claims in autumn 1991 to Archer, Cathro & Associates (1981) Ltd., and the option was assigned to Big Creek Resources in November 1991. The Casino deposit is a large copper-gold-molybdenum porphyry deposit, located at the northwest end of the Dawson Range. The 21 drill holes intersected a leach cap and underlying supergene and hypogene enriched alteration zones. Present geological reserves of the Casino deposit are estimated at 378 million t grading 0.3 percent copper, 0.34 g of gold per t and 0.04 percent molybdenum. Included in the calculation is a high grade core of 64.4 million t grading 0.46 percent copper and 0.48 g of gold per t. In December 1992, Big Creek Resources and Pacific Sentinel Gold Corporation amalgamated under the name of the latter company. A major exploration program was planned for 1993 to bring the property closer to development.

Gold

On the BREWERY CREEK property (26), east of Dawson, Loki Gold Corporation (49 percent) and Hemlo Gold Mines Inc. (51 percent) completed a two-phase exploration program to outline bulk-tonnage, low-grade oxide gold deposits. The phase 1 program, which was designed to delineate geochemical and geophysical targets, was completed in June 1992. The work included a 35 line-km induced polarization (IP) survey, test pitting, geological mapping and bulk density measurements. Five targets were identified south and east of the known mineralization. The second phase included test pitting, 15 reverse circulation drill holes, soil sampling and geological mapping. The program outlined target areas over a 12 km strike length. The drilling and trenching results were encouraging. The 1992 diluted geological reserves calculated by Orcan Mineral Associates are 16.5 million t in nine deposits grading 1.85 g of gold per t.

In the Mayo mining district, Amax Gold Inc. continued an extensive drilling and trenching program, begun in 1991, on its various property options in the Dublin Gulch and Haggart Creek areas (27). In 1992, Amax Gold completed 46 reverse circulation holes totalling 5,639 m.

Southwest of Dublin Gulch, H-6000 Holdings Ltd. conducted a program of soil and rock sampling, geological mapping and bulldozer trenching on the SCHEELITE DOME claims (28). A Cretaceous granodiorite stock, that intrudes sedimentary rocks of the Late Proterozoic-Early Cambrian Hyland Group, underlies this area. The program was designed to find porphyry-type gold mineralization.

Aurchem Exploration Ltd. continued exploration on its Discovery Creek option, 50 km west of Carmacks (33). Gold and silver-bearing veins occur along two major north-trending structures, named the Willow Creek and Eliza Creek zones. In 1992, geophysical and soil geochemical surveys, geological mapping, trenching and reverse circulation drilling were accomplished.

Arbor Resources Inc. continued to explore its substantial holdings in the Klondike District. In 1992, exploration included geological mapping and trenching. Reconnaissance work was carried on recently staked ground and more detailed work was conducted near the LONESTAR occurrence (29). The detailed work was designed to follow up geochemical anomalies previously outlined on Eldorado Creek between Gay Gulch and 27 Pup. Kennecott Canada Inc. optioned Arbor Resources' LONESTAR property (29) and carried out a program of trenching and reverse circulation drilling. Gold and silver mineralization occur in quartz veins and in oxide material in shear zones.

Northeast of the LONESTAR property, Carmacks Gold explored for epithermal mineralization in the Trail Hill area (30) on claims optioned from Arbor Resources Inc. Carmacks Gold conducted geophysical and geochemical surveys, prospecting and diamond drilling.

Placer Dome Inc. explored for porphyry-type gold mineralization on the VAN and SUN claims, north of Stewart River and in the Mt. Billings area, north of Watson Lake.

North of Clear Lake, Noranda Exploration Company Ltd. conducted a trenching and a reverse circulation drill program on its RUM and RYE claims (31).

On Mt. Anderson, in the Wheaton River area, south of Whitehorse, Adda Minerals conducted further exploration for gold-bearing veins and skarn mineralization on the ROB claims (32).

Northwest Territories

Mineral Production

Four gold mines and two zinc-lead mines operated in the Northwest Territories during 1992 (Map 2). Production statistics for the mines are given in Table 5.

The value of mineral production in the Northwest Territories was estimated at \$482.9 million in 1992 compared with \$489.1 million in 1990. Mineral production and depressed gold, zinc and lead prices continued in the same manner as the previous year. Zinc and lead production accounted for 60 percent of the mineral production value and gold accounted for 39 percent.

Exploration expenditures were expected to be higher than \$36 million in 1992, compared to an estimated \$36 million in 1991. Most of the attention during the year focused on the claim staking rush and diamond exploration play in the Lac de Gras area, in central Slave Structural Province, northeast of Yellowknife. Staking in the Northwest Territories during 1992 covered 7.18 million hectares (ha), with most of the claim staking, some 7 million ha, occurring in central Slave Structural Province. Staking was expected to continue at a strong pace during 1993, because of the apparently favourable results from some of the kimberlite pipes drill tested by BHP Minerals Canada Ltd., in joint venture with Dia Met Minerals Ltd. on their Lac de Gras discovery property, as well as from the large number of drill targets identified by other companies in the area.

The commitment of the joint venture partners Minnova Inc. and Metall Mining Corp. to seriously proceed toward a final feasibility study for the development of the IZOK (Izok Lake) base metal property, located 265 km south of Coronation Gulf, strengthened the future for other important undeveloped polymetallic sulphide deposits in the northern part of Slave Structural Province. The proposed Izok mine development is coupled with the development of a winter road between the IZOK property and Coronation Gulf, and a bulk marine shipping capability to transport some 400,000 t of concentrate annually from a new port to be developed on Coronation Gulf.

The six operating mines in the Northwest Territories employed 1,525 people at 1992 year end compared with 1,565 people at 1991 year end.

The mineral industry in the Northwest Territories accounted for 15.2 percent of the zinc, 12.3 percent of the lead and 8.8 percent of the gold produced in Canada during 1992. The 1992 metallic mineral production value, \$476.2 million, amounted to 4.66 percent of Canada's 1992 metallic mineral production. This compares with 4.56 percent in 1991.

Mines

Cominco Ltd., Polaris Mine

The Polaris zinc-lead mine (a), ** concentrator and related exploration properties are 77.5 percent owned by Cominco and 22.5 percent by Pine Point Mines Limited. Cominco is the operator of the joint venture. The underground Polaris mine, located on Little Cornwallis Island, celebrated its tenth full year of operation in 1992. The Polaris mill processed 1,066,700 t of ore for an output of 217,932 t of zinc concentrate and 51,741 t of lead concentrate. This compares with 1,069,300 t of ore in 1991 that yielded 211,093 t of zinc concentrate and 40,515 t of lead concentrate. Record ore production in 1992 was achieved by pillar extraction. Surface exploration totalled 1,883 m in seven holes.

Type:	underground
Location:	Little Cornwallis Island (120 km northwest of Resolute)
Product:	zinc, lead
Mill Capacity:	3 100 tpd
Tonnes Milled:	1.07 million t
Reserves:	9.5 million t (December 31, 1992)
Reserve Grade:	14.0 percent zinc, 3.7 percent lead
Employees:	249 (December 31, 1992)

Conwest Exploration Company Limited, Nanisivik Mine

The Nanisivik mine is operated by Nanisivik Mines Ltd., a wholly-owned operating division of Conwest Exploration Company Limited. In 1992, mill concentrate production at the Nanisivik mine (b) was reduced marginally from the previous year because a lower average grade of mill feed was mined, as a planned response to weak zinc markets. The mill processed 694,600 t of ore at an average grade of 7.7 percent zinc, 0.3 percent lead and 32 g of silver per t to yield 92,100 t of zinc concentrate and 600 t of lead concentrate. The concentrate contained 51,200 t of zinc, 300 t of lead and 16,000 kg of silver. Concentrate shipments during the year amounted to 93,500 t.

**Numbers or letters in parenthesis indicate the location of the property on Maps 2 and 3.

Underground exploration successfully delineated additional reserves, so that total proven and probable reserves decreased only by approximately 100,000 t despite mining close to 700,000 t during the year. An estimated 9,300 m of underground drilling was completed. In August 1992, the cumulative tonnage mined, since beginning operations in 1976, exceeded 10 million t.

Type:	underground
Location:	27 km east of Arctic Bay, Baffin Island
Product:	zinc, lead, silver
Mill Capacity:	2 000 tpd
Tonnes Milled:	694 600 t
Reserves:	2 319 000 t (December 31, 1992)
Reserve Grade:	8.5 percent zinc
Employees:	202

**Table 5: Mineral Production of Operating Mines,
Northwest Territories, 1990, 1991 and 1992**

Company, Mine and Commodity	1990		1991		1992 (P)	
	t	kg	t	kg	t	kg
Cominco Ltd.						
Polaris Mine						
zinc	142 392		100 384		100 384	
lead	37 692		24 398		31 599	
Echo Bay Mines Ltd.						
Lupin Mine						
gold		6 072		6 746		6 671
Royal Oak Mines Ltd.						
Giant Mine						
gold		3 647		3 183		2 982
Conwest Expl. Company Ltd.						
Nanisivik Mines Ltd.						
Nanisivik Mine						
zinc	56 200		54 800		51 200	
lead	1 400		400		300	
silver		18 100		18 500		16 000
NERCO Con Mine Ltd.						
NERCO Con Mine						
gold		3 643		3 825		3 732
Northwest Gold Corp.						
Colomac Mine						
gold		2 130		2 423		NIL
Treminto Resources Ltd.						
Ptarmigan Mine						
gold		558*		462*		476*

Source: Department of Indian Affairs and Northern Development. These figures are reported by the mines as production and will not match Statistics Canada's production figures that are based on metals sold or shipped.

(P) = Preliminary N/A = Not Available NIL = No Production

* Fiscal year August 1 to July 21 (i.e. August 1, 1991 to July 1, 1992 for fiscal year 1992)

Echo Bay Mines Ltd., Lupin Mine

The Lupin gold mine (c) is located 90 km south of the Arctic Circle and approximately 400 km northeast of Yellowknife. The 10th anniversary of the Lupin mine was celebrated in October 1992.

During the year, the mine produced 6,671.1 kg of gold compared with 6,745.9 kg in 1991. Ore throughput at the Lupin mill was 1,853 tpd compared with 1,813 tpd in 1991. A 15 percent expansion of the mine and mill began in 1992 and is scheduled to be completed in early 1993. This project will increase production capacity at Lupin from 1,815 tpd to 2,085 tpd. During the year, a new service hoist and cage for transporting personnel and materials was added in the existing shaft and another ore crusher was installed at the bottom of the shaft at a depth of 1 130 m. The deepest mining for ore production in 1992 was from the 650 m level. Lupin's proven and probable reserves have been delineated to a depth of 1,170 m.

Type:	underground
Location:	400 km northeast of Yellowknife
Product:	gold
Mill Capacity:	2 000 tpd
Tonnes Milled:	675 000 t
Reserves:	3.44 million t (December 31, 1992)
Reserve Grade:	10.07 g of gold per t
Employees:	404 (December 31, 1992)

NERCO Con Mine Ltd., NERCO Con Mine

NERCO Con Mine Ltd. is a unit of NERCO Minerals Company and both are wholly owned by NERCO, Inc. Production at the NERCO Con mine (d) was from underground from the 2,300-foot to the 5,900-foot levels. The mine produced approximately 3,732 kg of gold and 933 kg of silver in 1992. This compares with 3,825 kg of gold in 1991. NERCO completed the construction of a pressure oxidation circuit (autoclave) in 1992. It is designed to process refractory ores and to neutralize arsenic-bearing tailings. Approximately 57,500 m of underground ore-definition drilling was completed.

Type:	underground
Location:	1.4 km south of Yellowknife
Product:	gold, silver
Mill Capacity:	650 tpd
Tonnes Milled:	354 700 t
Reserves:	Underground: 3.2 million t (December 31, 1992) Surface: 4.62 million t (December 31, 1992)
Reserve Grade:	Underground: 10.63 g of gold per t Surface: 1.37 g per t
Employees:	371 (December 31, 1992)

Royal Oak Mines Inc., Giant Mine

In July 1991, Royal Oak Mines Inc. was formed by the amalgamation of Royal Oak Resources Ltd., Pamour Inc., Pamorex Minerals Inc., Akaitcho Yellowknife Gold Mines and Giant Yellowknife Mines Limited. All ore production at the Giant mine (e) in 1992 was from underground. Following the start of a bitter strike on May 23, 1992, production was maintained with the assistance of staff, contract replacement workers and non-striking union workers. The mine was shut down for one week following a tragic underground explosion, on September 18, 1992, that killed nine miners. The strike continued at year end 1992, and 240 unionized employees were locked out. The Giant mill processed 358,354 t of ore at an average grade 9.806 g of gold per t to yield 2,982 kg of gold. This compares with 390,065 t of ore processed in 1991 at an average grade of 9.394 g of gold per t to yield 3,183 kg of gold. Approximately 17,400 m of exploration and development drilling were completed.

Type:	underground
Location:	2.4 km north of Yellowknife
Product:	gold, silver
Mill Capacity:	1 000 tpd
Tonnes Milled:	395 108 t
Reserves:	N/A
Reserve Grade:	N/A
Employees:	279 working (December 31, 1992)

N/A Not Available

Treminco Resources Ltd., Ptarmigan Mine and Tom Mine

At the Ptarmigan and Tom mines (f), gold production for the company's 1992 fiscal year (August 1, 1991 to July 31, 1992) amounted to 475.9 kg. of gold compared to 462.4 kg of gold in the previous fiscal year. Approximately one-third of production was from the C vein zone and one-third of production came from the Tom vein. Tonnes milled in the 1992 fiscal year dropped to 42,365 t from 52,707 t in the previous fiscal year.

Type:	underground
Location:	20 km east of Yellowknife
Product:	gold
Mill Capacity:	180 tpd
Tonnes Milled:	42 365 t
Reserves:	49 985 t (July 31, 1992)
Reserve Grade:	8.57 g of gold per t
Employees:	20 (December 31, 1992)



Mineral Dispositions

Staking in 1992 was concentrated in central Slave Province, where the staking of diamond exploration properties continued to expand outward from the Lac de Gras area. The number of claims staked in 1991 increased dramatically in November and December after the discovery of a diamondiferous kimberlite pipe in the Lac de Gras area was announced. The staking rush continued unabated in 1992.



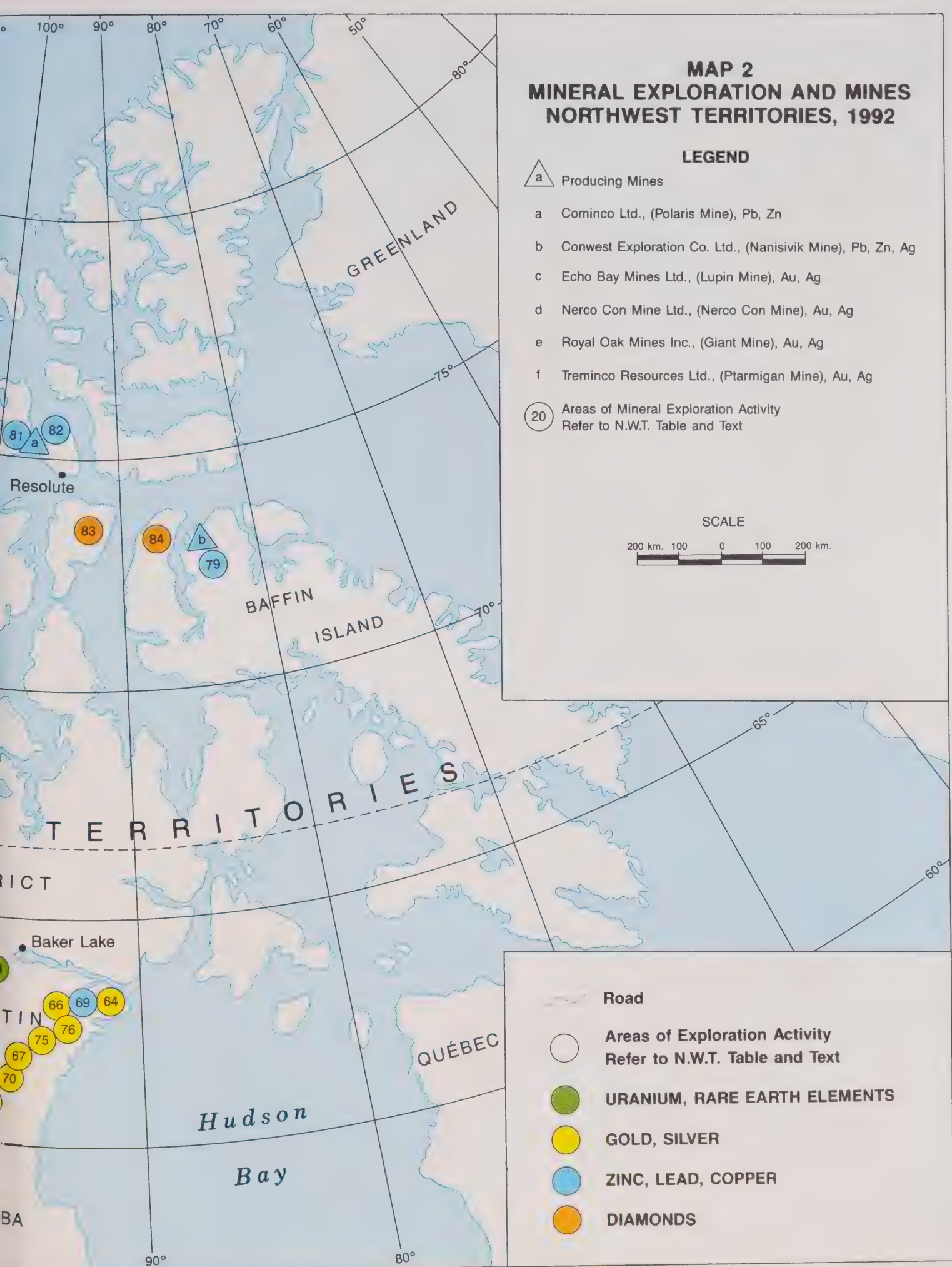
MAP 2 MINERAL EXPLORATION AND MINES NORTHWEST TERRITORIES, 1992

LEGEND

-  Producing Mines
- a Cominco Ltd., (Polaris Mine), Pb, Zn
 - b Conwest Exploration Co. Ltd., (Nanisivik Mine), Pb, Zn, Ag
 - c Echo Bay Mines Ltd., (Lupin Mine), Au, Ag
 - d Nerco Con Mine Ltd., (Nerco Con Mine), Au, Ag
 - e Royal Oak Mines Inc., (Giant Mine), Au, Ag
 - f Treminco Resources Ltd., (Ptarmigan Mine), Au, Ag
-  Areas of Mineral Exploration Activity
Refer to N.W.T. Table and Text

SCALE

200 km. 100 0 100 200 km.

By 1992 year end, 7,913 claims, covering 7.18 million ha in the Northwest Territories, were recorded, compared with 831 claims covering 666,374 ha in 1991 (Table 6).

On February 1, 1992, 43 Prospecting Permits expired or were relinquished and 22 new permits were granted. Homestake Mining Company and Comaplex Minerals Corp. obtained 11 permits in the Rankin-Ennadai volcanic belt in the District of Keewatin, where the target is presumed to be gold. R.C. Day obtained a permit near the NWT-Saskatchewan border, where the target may be nickel and platinum group elements in ultramafic rocks. Aber Resources Ltd. obtained four permits on Victoria Island, where it has been exploring for copper. Noranda Minerals Inc. obtained permits in the Tree River area, on the boundary between Bear Province and Slave Province, and in the southwestern part of the Borden Peninsula, northwestern Baffin Island. Targets in both areas may be copper in sediments. Minnova Inc. obtained four Prospecting Permits around the Hood #10 deposit. The company is actively exploring for volcanogenic polymetallic sulphide deposits in the region.

Geoscience Support

The activities and recent publications of Geology Division, Northern Affairs Program, DIAND, in Northwest Territories Region are described in *Exploration Overview 1992*. It may be obtained from: Dr. W. A. Padgham, Chief Geologist, Geology Division, Northern Affairs Program, DIAND, P.O. Box 1500, Yellowknife, NWT, X1A 2R3.

The Canada-Northwest Territories Economic Development Framework Agreement was signed in February, 1991. Under the agreement, the Department of Indian Affairs and Northern Development (DIAND) and the Government of the Northwest Territories (GNWT) will co-operate in the delivery of a number of Economic Development Initiatives.

Four of the Economic Development Initiatives fall under the title of the Mineral Initiatives. These initiatives have a budget of \$8.2 million over the term of the agreement, 1991-1996, and are divided as follows:

I Geoscience Initiative	\$7.5 million
II Technology Initiative	\$200,000
III Information Initiative	\$200,000
IV Prospector's Initiative	\$300,000

The Department of Energy, Mines and Petroleum Resources (EMPR), GNWT, is the implementing party for the initiatives. It has established a Mineral Initiatives Office to co-ordinate their delivery of the initiatives.

In 1992, 18 geoscience field projects operated under the Geoscience Initiative. The regional bedrock mapping (NATMAP) project in Slave Structural Province integrates geoscience work funded under the Geoscience Initiative with work funded by the Geological Survey of Canada (GSC) and Geology Division, DIAND. NATMAP is an initiative of the GSC that is designed to increase the level of field-based mapping in Canada. Some 15 geoscience projects were co-ordinated under the NATMAP umbrella. The GSC conducted 12 mapping projects. Four geological mapping projects were conducted directly by the Mineral Initiative Office at Yellowknife.

MAP 3
MINERAL EXPLORATION AND MINES
IN SLAVE STRUCTURAL PROVINCE, 1992

LEGEND

(20) Areas of Mineral Exploration Activity,
Refer to N.W.T. Table and Text

Gold, Silver

Copper, Zinc, Lead

Diamonds

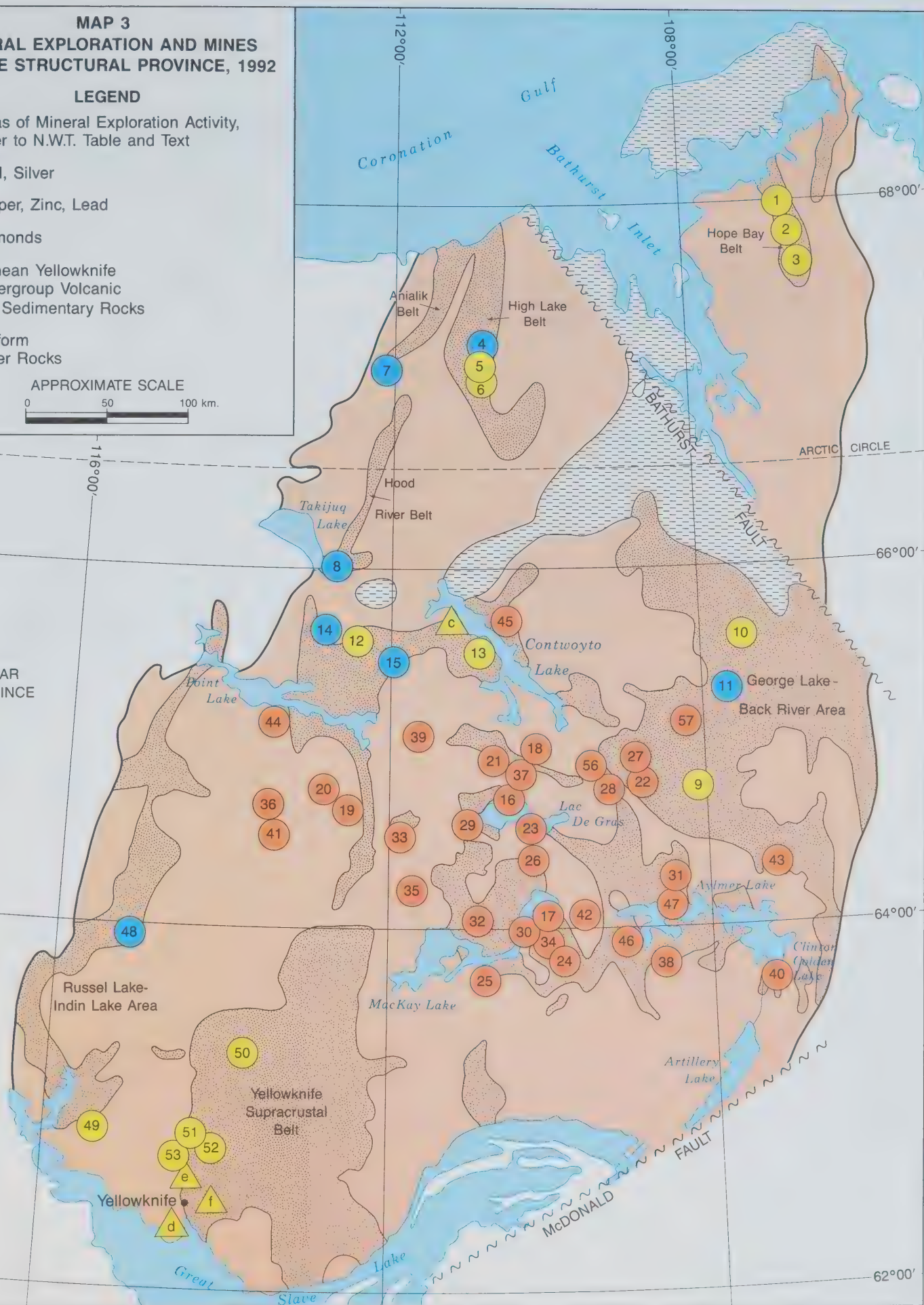
Archean Yellowknife
Supergroup Volcanic
and Sedimentary Rocks

Platform
Cover Rocks

APPROXIMATE SCALE

0 50 100 km.

BEAR
PROVINCE



The Geology Division, NWT Region, DIAND, continued work on two bedrock mapping projects. In addition, the GSC continued to develop the Mineral Resources Map of the Northwest Territories. Geology Division, NWT Region, DIAND, is developing a Computerized Mineral Showings Database of the Northwest Territories.

Mineral Exploration

Mineral exploration expenditures in the Northwest Territories in 1992 were expected to be more than \$36 million compared with an estimated \$36 million the previous year. The exploration projects for diamonds in central Slave Structural Province and base-metal drilling projects in northern Slave Province account for nearly an estimated 80 percent of the 1992 exploration expenditures. Slave Province, with 68 projects, and Keewatin, with 25 projects, accounted for at least 86 percent of all the properties worked in 1992. In the Lac de Gras area, at least five drilling projects tested targets for kimberlite pipes. During the year, about 20 holes were drilled and 16 new kimberlite pipes were reported (more probably 18), of which 10 were reported to be diamondiferous. Nine of the diamondiferous pipes were located on the BHP Minerals/Dia Met discovery property at Lac de Gras. At least 25 projects in the area involved soil sampling for kimberlite indicator minerals and/or airborne geophysical surveys to identify kimberlite targets. Companies also sampled known kimberlite diatremes in the Mackenzie Mountains and on Somerset Island. A new kimberlite diatreme was identified at Dubawnt Lake, in the District of Keewatin. The success of the 1992 diamond exploration activity in central Slave Province should ensure that diamond exploration will continue unabated for a number of years.

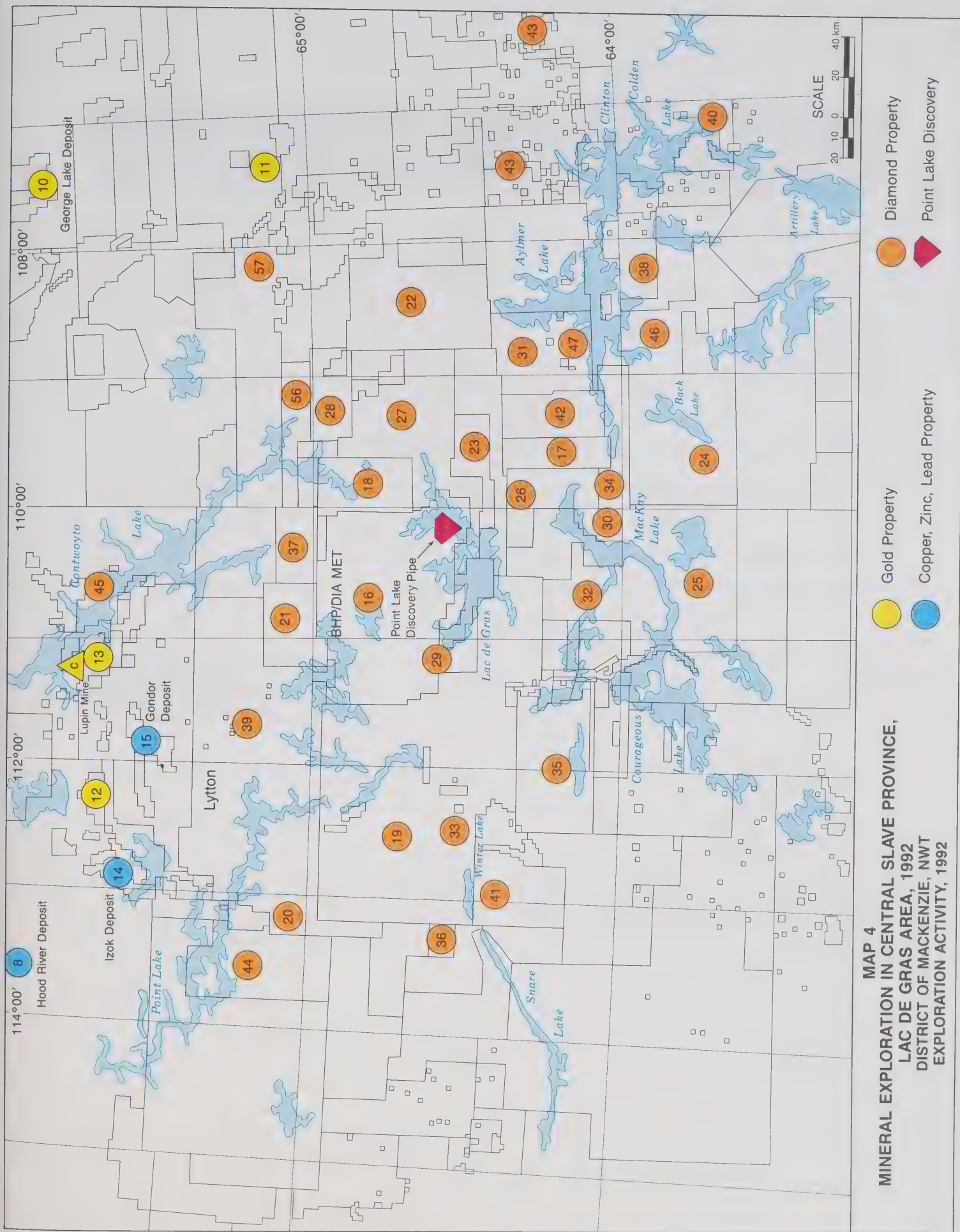


Table 6: Mineral Claims, Leased Claims, Prospecting Permits, Northwest Territories, 1991 and 1992

	1992 Calendar Year	1991 Calendar Year
Number of Claims and Leases in Good Standing	10 974	3 859
Hectares For Above	9 227 521	2 519 428
Number of Leased Claims	10 348	11 396
Hectares (Surveyed) For Above	256 824	277 280
Claims Recorded	7 913	831
Hectares For Above	7 178 096	666 374
Prospecting Permits Issued	22	34
Hectares For Above	408 115	634 940
Prospecting Permits Cancelled, Expired or Relinquished	43	49
Prospecting Permits in Good Standing	70	91
Hectares For Above	1 322 935	1 760 551

Source: Mining Lands Division, Department of Indian Affairs and Northern Development, Yellowknife, NWT.

Table 7: Diamond Drilling, Northwest Territories, 1991 and 1992

	1992 Calendar Year	1991 Calendar Year
	Meters (m)	
Surface Drilling	96 098	110 527
Underground Drilling	75 540	73 347
Total Drilling	169 638	183 874

Source: Geology Division, Department of Indian Affairs and Northern Development, Yellowknife, NWT

Exploration Projects

Northern Slave Structural Province

Hope Bay Volcanic Belt

BHP Minerals Canada Ltd. completed geological mapping, soil sampling, a 29 line-km induced polarization (IP) survey, a 49.5 line-km magnetic and VLF-EM (very low frequency electromagnetic) survey, and 4,112 m of drilling in 24 holes. The drill holes tested an auriferous shear zone on the BOSTON claim (3). The MADRID & SANTIAGO claims (1) and HAVANA claims (2) were mapped and sampled.

High Lake and Anialik Volcanic Belts

BHP Minerals Canada Ltd. continued work on its ULU claims (6) in the central part of the High Lake Belt. The company drilled 6 758 m on the claims to test the Flood zone and peripheral gold-bearing structures. In 1991, the company drilled 21 000 m in 42 holes to delineate the Flood zone gold deposit. In 1992, detailed mapping, soil sampling and VLF-EM and resistivity surveys were completed on the Flood zone and the nearby Gnu zone. A 10-m by 40-m trench was excavated to explore a portion of the Flood zone. The company also mapped the PULSE and KINDLE claims (6) and identified an auriferous shear zone in gabbro. This shear zone was evaluated by a 51.6 line-km magnetometer and VLF-EM survey, a 3 line-km VLF-EM/resistivity survey, soil sampling and seven drill holes, totalling 294 m. The company also mapped and sampled the BAMAKO claim (5) and SINGLETON claim (6).

Aber Resources Ltd. signed an agreement with Kennecott Canada Inc. to earn a 50 to 60 percent interest in Kennecott's High Lake copper-zinc-precious metal deposit (4). Drilling in 1956-1957 outlined 4.72 million t grading 3.5 percent copper, 2.5 percent zinc and 0.8 g of gold per t in the D and AB zones. During 1982, Aber Resources completed 17 drill holes in the same zones. Gravity and HL-EM (horizontal loop electromagnetic) surveys were conducted.

Noranda Minerals Ltd. drilled three holes to test copper prospects on the TR claims (7), which straddle the boundary between Bear and Slave Structural Provinces.

Hood River Volcanic Belt

Minnova Inc. and Metall Mining Corp. mapped and sampled the HOOD property (8), located 50 km north of Izok Lake. Previous work outlined massive sulphide mineralization in three deposits, which together contain approximately 3 million t grading 3 percent copper, 4 percent zinc, 20 g of silver per t and 0.7 g of gold per t. In 1992, the companies drilled seven holes totalling 3 000 m and completed deep EM surveys on the HOOD 10, HOOD 461 and HOOD 462 claims and the newly discovered Shadow showing.

George Lake-Back River Area

BHP Minerals Canada Ltd. drilled five holes totalling 318 m to test gold-bearing iron formation on the ROYAL claim (9).

The Back River Joint Venture, comprising Homestake Mining Company Ltd., Kerr-McGee Corporation and the MacLab Group, drilled 5 000 m in about 40 holes in two blocks to test gold-bearing iron formation on the BRAU claims (10) at Boot Lake and Goose Lake. In 1991, the joint venture drilled 28 690 m in 140 holes on the BRAU claims. Homestake announced an undiluted inventory of 3.08 million t, grading 12 g of gold per t in five deposits located along the limb of an oxide-facies iron formation.

Kingswood Resources Inc. signed a letter of intent with Noranda Minerals Inc. to earn a 100 percent interest in the MUSK base metal-gold-silver deposit (11). The deposit has geological reserves of 351,350 t grading 1.71 g of gold per t, 345 g of silver per t, 1.2 percent copper, 1.4 percent lead and 10.4 percent zinc.

Contwoyto-Itchen-Point Lakes Area

On the Lupin mine property (c), Echo Bay Mines Ltd. drilled 20 holes from the surface to test geophysical anomalies that were interpreted as sulphidic iron formation. The company completed an 82-km combined HL-EM and magnetic survey and a 52-km detailed magnetic survey. On the adjacent MUD claim, the company also completed a 131-km combined HL-EM and magnetic survey.

Echo Bay Mines Ltd. mapped, prospected, trenched, channel sampled and completed magnetic and HL-EM surveys on the SKI claims and leases (12). Eighteen holes, totalling 1 100 m, were drilled on the SKI 1 claim to test three zones containing sulphide-rich iron formation.

Contwoyto Goldfields Limited and Kingswood Explorations 1985 Limited mapped and prospected on the DIGGER claims (13).

In 1991, Minnova Inc. purchased the IZOK (14), HOOD (8) and GONDOR (15) properties from Falconbridge Ltd. Under an agreement closed in March 1992, Metall Mining Corp. can earn 40 percent of Minnova's interest in the IZOK, HOOD and GONDOR properties. The companies combined their mining and financial strength in a bid to develop the IZOK base metal property. In the third quarter of 1992, Kerr Addison Mines Limited sold its 50.4 percent controlling interest in Minnova Inc. to Metall Mining Corporation and the remaining 49.6 percent interest in Minnova was held by minority shareholders.

Minnova Inc. and Metall Mining Corporation completed an airborne geophysical survey of the 40 percent Noranda-owned GONDOR property (15). The property is 60 km east of Izok Lake. The Gondor deposit has geological reserves of 7.3 million t of massive sulphides, grading 0.2 percent copper, 4.8 percent zinc and 48 g of silver per t.

Minnova Inc. and Metall Mining Corporation explored the IZOK property (14) to advance the feasibility of mining the Izok deposit. The deposit is comprised of two large massive lenses. Recalculated geological reserves, based on 13,071 m of additional definition drilling in 1992, amount to 13.6 million t grading 2.5 percent copper, 14.6 percent zinc, 1.6 percent lead, 77.7 g per t of silver and 0.1 g per t of gold. The bulk tonnage is amenable to open-pit mining. The 1992 drill program included 18,000 m in 122 holes that were drilled from the ice and islands of Izok Lake. These holes include the definition holes, that were drilled on 30 to 60 m centres to increase the confidence in the reserves estimate.

A new massive sulphide deposit, the Inukshuk, was discovered 250 m east of the Izok deposit, by drilling a deep pulse EM anomaly, that is located on trend with the Izok deposit. Reserves of the Inukshuk deposit are estimated at 2 million t grading 2 percent copper and 8 percent zinc, based on widely spaced holes. Further delineation drilling will be conducted in 1993.

During 1992, the joint venture conducted feasibility studies to assess the metallurgical, environmental and engineering aspects of the Izok project. The transportation and social considerations of the project were given special emphasis. Anticipated infrastructure development requirements include a winter road to Coronation Gulf, some 265 km to the north-northwest, a port facility on Coronation Gulf, and a reliable, affordable shipping capability to transport some 400,000 t of concentrate annually to overseas smelters. During 1992, Canarctic Shipping Company Limited conducted a major study for the development of a marine transportation system to serve the Izok project.

Exploration for Diamonds in Central Slave Province, Centred on the Lac de Gras Area

Claims staked in Central Slave Province from October 1991, when the Point Lake kimberlite pipe was discovered, to 1992 year end, extended within an area approximately 450 km long in an east-west direction and 300 km wide in a north-south direction, with the centre of the staking area being the BHP Minerals/Dia Met property (16) at Lac de Gras (Map 3 and Map 4). Staking and exploration for diamonds extended into the Contwoyto-Itchen-Point Lakes area, located north and west of Lac de Gras and to the George Lake-Back River area located northeast of Lac de Gras (Map 3). A total of 16 new kimberlite pipes were reported during 1992, to bring the reported total to 17 since the first pipe was drilled at Point Lake, near Lac de Gras, in October 1991.

The BHP Minerals Canada Ltd. (51 percent) and Dia Met Minerals Ltd. (29 percent) joint venture (referred to as BHP Resources/Dia Met) established a winter camp at Point Lake, immediately north of Pointe de Misère on Lac de Gras, to test the Point Lake discovery diamondiferous kimberlite pipe. The pipe was initially drilled in fall 1991. During February and March 1992, 37 large-diameter vertical reverse circulation rotary drill holes were drilled through the ice covering Point Lake. The pipe underlies the circular-shaped Point Lake, which is up to 50 m deep. The pipe is estimated to have a surface area of 30.4 ha. The holes were spaced 52-105 m apart and were terminated at the kimberlite-country rock boundary or at a vertical depth of 236 m within the kimberlite pipe. A 160 t sample of the composite drill cuttings was collected and transported to Dia Met's diamond extraction mill at Fort Collins, Colorado. The 160 t sample yielded 101 carats (ct) of diamonds. Twenty-five percent of the diamonds were of gem quality, and some were in the one to three ct range.

The BHP Minerals/Dia Met joint venture conducted a ground orientation survey to obtain the detailed geophysical signature of the Point Lake pipe. The joint venture also completed airborne EM and magnetic geophysical surveys over their property. CF Mineral Research of Kelowna, B.C., was contracted to conduct helicopter-supported kimberlite indicator mineral sampling and analysis of till and eskers on the property. The indicator minerals include pyrope garnet, chrome diopside, ilmenite and chromite, that have been dispersed in the glacial soils by surficial glaciation from their source in kimberlite diatremes. The geophysical data together with the indicator mineral anomalies from sampling in 1991 delineated targets for drilling during 1992. During the first three quarters of 1992, the joint venture identified nine new kimberlite pipes (designated 92 A through 92 I) by drilling and by geological mapping (in addition to the Point Lake pipe that was bulk tested).

In December 1992, the BHP Minerals/Dia Met joint venture reported that gem-quality diamonds in variable proportions were found in drill core, surface samples and soil samples taken from the nine kimberlite pipes found in 1992. The soil samples refer to samples of soil that overlie a pipe. The results were reported in terms of the number of macrodiamonds and the number of microdiamonds, where the former are greater than 0.5 mm in diameter (35 mesh Tyler) and the latter are smaller than 0.5 mm in diameter. The results are shown in Table 8.

Table 8: Sample Results From Nine Kimberlite Pipes On The BHP Minerals/Dia Met Property, Lac de Gras, Northwest Territories, 1992

Kimberlite Pipe	Sample Type	Sample Weight (Kg)	No. of Macro-Diamonds	No. of Micro-Diamonds
92 A	Surface	40.0	2	10
92 B	Surface	72.2	23	117
92 C	Core	161.4	10	28
92 D	Soil	25.7	2	2
92 E	Core	69.9	11	36
92 F	Core	23.2	1	12
92 G	Core	122.0	8	45
92 H	Core	60.0	1	7
92 I	Core	122.4	55	132

Source: BHP Minerals Canada Ltd. and Dia Met Minerals Ltd. Report, December 9, 1992

The BHP Minerals/Dia Met joint venture planned to bulk test at least two of the nine new diamondiferous kimberlite pipes during winter 1993 by conducting a large-diameter drilling program similar to the 160 t bulk-test drilling program completed on the Point Lake pipe. During 1992, the joint venture staked the AB claims (17), located some 30 km southeast of the Point Lake pipe.

Monopros, the Canadian subsidiary of DeBeers Consolidated Mines, collected soil samples for kimberlite indicator minerals on its claim groups, which adjoin the BHP Minerals/Dia Met property on its northeastern (18) and western boundaries (19). Monopros conducted airborne geophysical surveys over portions of the claims and drilled kimberlite targets on the south end of Hardy Lake, east of the BHP Minerals/Dia Met property. Other sources reported that Monopros drilled up to four holes in two kimberlite pipes. Monopros in joint venture with Aaron Oil Corporation sampled the latter's property (20) for indicator minerals. The Aaron Oil property adjoins the northwestern boundary of the Monopros claim block, approximately 165 km northwest of the Pipe Lake discovery pipe.

Dighem completed an 1 800-km airborne magnetic and EM survey over the claim block of Tanqueray Resources Ltd. and Fibre-Clad Industries Ltd. (21), located immediately north of the northern boundary of the BHP Minerals/Dia Met property at Lac de Gras.

Following the discovery of the Point Lake pipe on the BHP Minerals/Dia Met property in fall 1991, Kennecott Canada Inc., the Canadian subsidiary of RTZ Corporation, formed a joint venture with a number of companies that held claims to the east and south of the BHP Minerals/Dia Met property. On the Diavik project, Kennecott Canada formed a joint venture with Aber Resources Ltd., SouthernEra Resources Ltd. and Commonwealth Gold Corporation to explore claims located south and east of the BHP Minerals/Dia Met claim block at Lac de Gras (22). Other participants in the Diavik project include Pure Gold Resources Inc., Tenby Resources Inc., Westfort Petroleums Ltd., Venturex Resources Ltd., KRL Resources Corp. and D. Johnson. The members of the Diavik project completed a 22 000 line-km of high resolution airborne EM and magnetic survey at a 150 m spacing. The survey covered 486 000 ha and cost close to one million dollars. Selected airborne geophysical anomalies were sampled for indicator minerals, mapped and tested by ground geophysics. The survey outlined over 35 priority targets within 12 to 47 km of the Point Lake discovery pipe. Over 1 200 till and esker soil samples were collected, a selected number were concentrated in the field and all samples were sent to Lakefield Research, Lakefield, Ontario, for mineralogical analyses.

The Diavik project joint venture commenced a nine-hole drill program in September 1992, on the Tenby and adjoining property (23), located south and east of the Point Lake discovery pipe. The claims are held by Aber Resources, Commonwealth Gold and SouthernEra. Seven of the drill holes successfully located seven separate kimberlite intrusions near the southern shore of Lac de Gras, approximately 20 km southeast of the Point Lake discovery pipe. The kimberlite pipes were located on the two claim groups. Three of the pipes are diamondiferous. Core samples from one drill hole that were analyzed at the Lakefield Research facilities in Ontario yielded three microdiamonds. Under the Diavik agreement, Kennecott Canada Inc. has a right to earn 60 percent of the interest of both Aber Resources and SouthernEra Resources.

In the Back Lake area, located approximately 90 km south of the Point Lake discovery pipe, Kennecott Canada Inc. agreed to finance the Back Lake project that includes claims falling under a pooling agreement among Kalahari Resources Inc., Island Arc Resources Ltd., Gulfside Industries, Slumber Magic Ventures, American Exploration Corp., Kestrel Resources Ltd., and Ballatar Explorations Ltd. Kalahari Resources reported that a 3 813 line-km airborne EM and magnetic survey had been completed at a line spacing of 200 m. The survey identified 40 anomalies on the Back Lake claim group (24) at Back Lake and 57 anomalies on the MacKay Lake property (25) located immediately to the west at MacKay Lake. A total of 82 soil samples were collected on the Back Lake property and 172 soil samples were collected on the adjacent MacKay Lake property.

Kennecott Canada Inc. and associated companies, Aber Resources Ltd., SouthernEra Resources Ltd., and Commonwealth Gold Corp., optioned a claim block from DHK Resources Ltd. (26), located about 25 km south of the Point Lake discovery kimberlite pipe. DHK Resources is comprised of Dentonia Resources Ltd., Horseshoe Gold Mining Inc. and Kettle River Resources Ltd. Kennecott completed an airborne geophysical survey over the property and evaluated targets by taking 135 soil samples for indicator minerals. Previously, DHK Resources collected 61 soil samples for indicator minerals analysis. The soil samples from the WO claims contained variable amounts of indicator minerals. Four samples collected six kilometres down ice from a significant coincident magnetic and EM anomaly contained abundant indicator minerals, including G-10 pyrope garnets and chrome diopside grains. Another geophysical anomaly was identified on the W1 claim and the anomaly has an associated indicator mineral train.

Northeast of Lac de Gras, Kennecott Canada Inc. expanded its exploration by completing option agreements with Argus Resources Ltd. (with Bre-X Minerals), Almaden Resources Ltd. (with partners Williams Creek Exploration Limited and Troymin Resources Ltd) (56). Kennecott Canada Inc. also finalized option agreements with Geomaque Explorations Ltd., KRL Resources Corp., Stall Lake Mines Limited, Thermal Exploration Company and Totem Health Sciences Inc. (57). To the south of the BHP Minerals/Dia Met property at Lac de Gras, Kennecott Canada Inc. optioned claims from Teryl Resources Corp. and partner Calco Resources Inc. (29). Aber Resources Ltd., SouthernEra Resources Ltd. and Commonwealth Gold Corporation also have an interest in a number of these option agreements.

A Digheem airborne magnetic and EM survey was flown over KRL Resources Corp.'s WPG claims (27) and 18 priority targets were identified. Sixty-six soil samples were collected and sent away for heavy mineral processing.

Totem Health Sciences Inc. identified magnetic and EM anomalies on its property (28) and collected 83 soil samples down-ice from the anomalies. Chrome diopside was visually identified in one of the samples collected.

Teryl Resources Corp. and Calco Resources Inc. announced that seven separate airborne geophysical targets were identified on their AMAD claims (29), under option to Kennecott Canada Inc. The claims adjoin the southern boundary of the BHP Minerals/Dia Met property. These anomalies were followed up by a soil sampling program that identified diamond indicator minerals at all seven anomalous sites.

Bellex Mining Corp. explored its AB claims (30) in the MacKay Lake area and its S claims (31) in the Aylmer Lake area. The company merged with Adonos Resources Inc. to form a new company named ADEX Mining Corp. The new company holds interests ranging from 75 to 100 percent in three properties and a 25 percent interest in one property, all in the Lac de Gras area.

In the MacKay Lake area, Layfield Resources Inc. soil sampled the AD claims (32) to evaluate targets obtained in an airborne geophysical survey.

Winspear Resources Ltd. contracted Geonex Aerodat Inc. to fly an airborne VLF-EM and magnetic survey at 100-m line spacing over its DEST claims (33), at Lake Providence, 80 km due west of the Point Lake pipe. Twenty-five magnetic anomalies were identified and 28 till soil samples were collected for analysis. Most of the samples were reported to be anomalous, and concentrations were found down-ice from magnetic lows. The company also collected 67 till samples from its JL claims (34) at Jolly Lake and its nearby claims at Courageous Lake (35), located about 65 km southwest of the Point Lake discovery pipe. The latter property is held jointly with Consolidated Newgate Resources Ltd. About 42 percent of the soil samples yielded pyrope garnets, and five airborne targets were identified up-ice from the indicator minerals. Winspear, in conjunction with International Vestor Resources Ltd., explored the Snare Lake Property (36), 150 km due west of the Point Lake pipe at Lac de Gras, by collecting 28 till samples. Kimberlite indicator minerals were identified in 23 samples.

Tyler Resources Inc. and Golden Rule Resources Inc. completed an airborne EM and magnetometer survey over their Carat property (37) (the GH claims) that abuts on the northeast boundary of the BHP Minerals/Dia Met property at Lac de Gras. The companies also completed an airborne survey to cover their Crystal property (38) (the AC claims) south of Aylmer Lake. Several EM conductors, that may be indicative of kimberlite pipes, were identified on the Carat property and about 40 EM and magnetic anomalies were identified on the Crystal property. A total of 140 soil samples from nine target areas on the Carat property and 216 soil samples from 14 targets on the Crystal property were shipped to the Saskatchewan Research Council's geochemical and mineralogical laboratories for analysis. A drill program is planned for 1993.

Lytton Minerals Ltd. collected 800 soil samples for analysis on its 688 000-ha property, the ICE claims (39), which adjoin the BHP Minerals/Dia Met property on its northwestern boundary. Lytton reported that its ground magnetic survey and soil sampling for kimberlite indicator minerals revealed six targets, which will be drilled in winter 1993.

Pure Gold Resources Inc. optioned ground from Winslow Gold Corporation, Bodega Ventures Inc., Magna Carta Resources Inc. and ATNA Resources Ltd. The claims are in the Clinton-Colden Lake area (40), 140-180 km southeast of the Point Lake discovery pipe and in the Winter Lake and Humpty Lake areas (41), 130 km west-southwest of the Point Lake pipe. Ashton Mining of Australia, in joint venture with Pure Gold Resources, collected 158 soil samples of glacial till for kimberlite indicator mineral analysis. Twenty of the 21 esker samples from the Humpty Lake area are reported to contain pyrope garnet.

Intertech Minerals Corp. and Canamera Exploration soil sampled the DA claims (42) in the Aylmer Lake area.

Mountain Province Mining Inc. sampled its claims located south of Aylmer Lake.

Gerle Gold Ltd. contracted AEROQUEST to conduct a 2 700-km airborne VLF-EM and magnetic survey over ground in the Clinton-Colden Lake and Healy Lake area (43), 180 km east-southeast of the Point Lake discovery pipe. The company staked 64 claims to cover 108 magnetic anomalies. Some soil samples were taken to evaluate the anomalies. Teck Corporation and Cominco Ltd. signed an agreement to option the claims.

Texas Star Resources Corporation staked the PL claims and collected 412 till samples on the JC claims (44), in the Point Lake-Itchen Lake area, 180 km northwest of the Point Lake discovery pipe located near Lac de Gras.

Acadia Mineral Ventures Limited and Kingswood Exploration 1985 Limited explored the JOHN, SHIN and DLER claims (45) on the east side of Contwoyto Lake for diamonds by re-interpreting airborne EM and magnetic survey data and by sampling till, esker and beach deposit material for kimberlite indicator minerals.

Mountain Province Mining Inc. collected over 600 soil samples from its Kirk Lake properties (AK and CJ claims), south of Aylmer Lake (46). The samples were sent to Canamera Geological Services in Vancouver for heavy mineral separation.

In the Aylmer Lake area, Barexor Minerals Inc. conducted heavy mineral sampling on its claims (47).

Southern Slave Structural Province

Russell Lake-Indin Lake Area

BHP Minerals Canada Ltd. reconnoitred the Indin Lake area and staked the HELA claims (48) south of Damoti Lake and the TAIGA-TUTGIK group south of Chalco Lake (48).

Mr. D. Smith of Yellowknife trenched and sampled the Seven-Ores gold showing on the BONE claim (49) in the Russell Lake area.

Yellowknife Supracrustal Basin

Athabasca Gold Resources Ltd. drilled 22 short holes, totalling 1,002 m, to test the Nicholas Lake deposit (50). Previously, more than 16,000 m of drilling identified a preliminary reserve of 1.04 million t grading 15.8 g of gold per t. The 1992 program was financed by Royal Oak Mines Inc. Athabasca conducted geological mapping and sampling. Eight trenches tested the Teapot zone and a 500-m by up to 10-m zone of quartz veining, located five kilometres southwest of the Main showing.

Mr. W. Humphreys and Mr. D. Smith of Yellowknife sampled gold-bearing structures of the QUYTA claim group (51) and the RICH claims (51).

Ger-Mac Exploration Ltd. set up a mill on the MON property (52) and mined and milled a bulk sample.

Tremingo Resources Ltd. and DIW Geological Consultants Ltd. compiled information, prospected and sampled ground in the Yellowknife Supracrustal Basin. Tremingo also continued to explore its TOM and PTARMIGAN gold properties (f).

Savoy drilled four holes, totalling 800 m, to test auriferous zones on the Walsh Lake property (53) of Nebex Resources Ltd. Nebex Resources announced that it had concluded an option agreement with Royal Oak Mines Inc. to explore a portion of the North Belt claims, located immediately north of the Supercrest property. The North Belt claims contain three sub-economic gold deposits: the Crestaurium, the Lynx and the GKP. Nebex planned to develop drill targets in the vicinity of the Lynx-GKP zone.

Royal Oak Mines Inc. evaluated the North Belt claims and completed geophysical surveys designed to define drill targets in the Homer Lake, Likely Lake and Daigle Lake areas (53). The company drilled 2,760 m in eight holes to test a polymetallic massive sulphide deposit on the G claims at Homer Lake.

NERCO Inc. aggressively explored its mine property lease (d) by drilling and conducting a marine seismic survey on Yellowknife Bay and Back Bay. The company drilled 17 holes totalling 6 250 m on the YELLOWREX SOUTH claim (d), where two auriferous lenses were intersected. Based on the company's conventional mining width and dilution, the Yellowrex South zone has a probable resource of 125,700 t grading 8.23 g of gold per t and an incremental resource of 117,200 t grading 5.83 g of gold per t. Four holes drilled from Back Bay, in January 1992, intersected anomalous shear zones.

During February and March 1992, eight holes totalling 2,090 m were drilled from the ice on Yellowknife Bay. An anomalous shear zone was intersected. On the TAN claim group, 16 shallow holes totalling 2,380 m tested the southern portion of the Con Shear. Some of the holes returned significant gold-bearing intersections. During summer 1992, three holes drilled at Negus Point, totalling 1,310 m, intersected gold mineralization.

Bear Structural Province

Mr. H. Arden trenched and sampled silver prospects on the HORDEL claims (54) in the Camsell River area.

In the Coppermine River area, Cominco Ltd. mapped and drilled five holes to test stratigraphy and probe for copper on Prospecting Permits 1267-1271 (55), which cover part of the contact between the Haydrynian Rae Group and the Neohelikian Coppermine River Group.

Southeast Mackenzie District and the Great Slave Lake Plain

Mr. R. C. Day prospected and sampled tills for kimberlite indicator minerals in the vicinity of a mica peridotite intrusion near Scott Lake (58).

PNC Exploration (Canada) Ltd. drilled 12 holes totalling 2,700 m and completed a small ground EM survey on its Boomerang Lake uranium prospect (59).

MPH Consulting Limited conducted a drill program for Sandy Lake Exploration Ltd. on the BBX property (60), which contains a copper-bearing breccia pipe, near Taltheilei Narrows. Approximately 1,200 m of core were drilled. The results were not encouraging.

Cominco Ltd. drilled two holes, one to the north of Chedabucto Lake (61) and the other to the south. Both holes were targeted on magnetic anomalies and both intersected gabbro in basement rocks.

Cordillera

At the beginning of its 1992 exploration program, San Andreas Resources Corporation had estimated geological reserves in the #3 zone of the Prairie Creek property (62) at 1.8 million t, grading 11.75 percent zinc, 10.8 percent lead, 0.42 percent copper and 181.7 g per t of silver. During 1992, the company completed 15 holes totalling 3,900 m. The drill program increased the estimated reserves in the main structure and a new zone of high-grade, cavity fill-type lead-zinc-silver-copper mineralization. In total, over one million t was added to the reserve estimate. The company also explored the #6, #7, #8 and Winter Road zones and staked additional ground. Existing facilities on the site include a 1,200 tpd mill, a tailings pond, service facilities and a 1,000-m airstrip. These were constructed in 1981-1982 by Cadillac Explorations Ltd. for mine production.

Island-Arc Resources Corp. and partners, GoldPac Investments Ltd. and White Knight Resources Ltd. reconnoitred two claims staked to cover the Mountain diatreme (63). The Mountain diatreme is the largest of a small group of kimberlite pipes that occur in the Sayunei Range of the northern Mackenzie mountains.

District of Keewatin

Asamera Minerals Inc., in a joint venture with Comaplex Minerals Corp., completed an airborne EM survey on the eastern part of the NAT claims (64), near Meliadine River, northeast of Rankin Inlet. Over 5,000 m of drilling were completed, mainly in the Discovery zone, where the target was auriferous oxide iron formation. From 1989 to 1992, 54 holes were drilled on the property, of which 30 have returned high-grade gold values.

Approximately 24 km west of the Discovery zone, Rio Algom Ltd., in joint venture with Asamera Minerals Inc. and Comaplex Minerals Corp., drilled 2,500 m in the Western Lands area at Meliadine Lake (64).

Comaplex Minerals Corp., in joint venture with Melinga Resources Limited, worked on the Griffin Lake and Kognak River properties, where surface gold mineralization has been identified in Proterozoic sedimentary rocks. The companies drilled over 1,300 m and conducted geological mapping, HL-EM, VLF-EM, induced polarization (IP) and magnetic surveys on claims at Griffin Lake (65). The four targets drilled were sulphidized fracture zones in quartzite of the Proterozoic Hurwitz Group.

Comaplex Minerals Corp. prospected and mapped on Prospecting Permits (PP) 1294 and 1295, north of Parker Lake (66), PP 1297-1299, north of Montgomery Lake (67), PP 1296, northwest of Kiyuk Lake (68), and PP 1273, 1278 and 1279 in the McQuoid Lake area (69). The company also prospected and mapped on PP 1233-1237, in the Montgomery Lake area (70) and PP 1276 and 1277 in the Windy Lake area (71). Airborne EM surveys were conducted over base metal prospects at Sandhill, west of Gibson Lake (69) and over the Rankin Inlet Supracrustal Basin (64).

Homestake Mineral Development Corp. prospected and trenched on the MOON and DAWN claims (72), west of Ennadai Lake. The company also prospected and conducted an airborne VLF-EM and magnetic survey on the SUN claims (73), west of Kasba Lake. PP 1286-1287, southwest of Hyde Lake were prospected and the adjacent PP 1289 was prospected and partly surveyed by an airborne magnetic survey.

Leeward Capital Corp. (33.3 percent), in joint venture with Skeena Resources Ltd. (33.3 percent) and Connecticut Development Corporation (33.3 percent), discovered an exposed brecciated olivine-phlogopite kimberlite diatreme at Outlet Bay on Dubawnt Lake (74). The Outlet Bay diatreme covers a 20.2 ha area. In early 1993, a sample of the diatreme was reported to contain one gem-quality microdiamond and one G11 pyrope garnet from one of the four, 60-70 kg samples taken and analyzed. The Dubawnt area contains a large area of ultrapotassic flows, dykes and pyroclastic assemblages, that appear to have geochemical affinities with potash-rich kimberlite and lamproite rocks.

MH Resources Inc., a consortium of Dejour Mines Ltd., Noble Peak Resources Ltd. and private investors, prospected for base metals on the MAG claims, northeast of Heninga Lake (75).

Noble Peak Resources Ltd. prospected on the MJ and BUCK claims (76), located respectively south and east of Happy Lake.

Placer Dome Inc., as part of an option agreement with Noble Peak Resources Ltd., prospected, sampled till and conducted an IP survey on the MG and MJ claims (67) of the Southwin Project, between Kaminak Lake and Quartzite Lakes. The 1992 work concentrated on the Cache and Mac zones. On the Cache zone, previous drilling outlined 363 000 t grading 9.26 g of gold per t. On the Mac zone, 13 km southwest of the Cache zone, mafic volcanics have yielded up to 14.7 g of gold per t over 7 m.

On the Turquetil project, Placer Dome Inc. under an option agreement with MH Resources Inc. (40 percent owned by Noble Peak Resources Ltd.), completed IP, magnetic, and VLF-EM surveys, as well as prospecting and till geochemistry on the MAG, PAD, TIL and TURQ claims, all in the Turquetil Lake area (75). The property contains an 11.5-km long carbonatized shear zone. Previous drilling along the zone outlined preliminary geological reserves of 454,000 t grading 6.2 g of gold per t.

Noranda Exploration Co. Ltd. prospected and sampled till and bedrock on claims north of Watterson Lake (77).

Outpost Resources, through an option agreement with Sikaman Gold Resources Ltd., mapped and prospected near the Bowser showing on the MAZE claims and on the KAM claims at Kaminak Lake (75).

Urangesellschaft (Canada) Limited, in conjunction with PNC Exploration (Canada) Co. Ltd. and Daewoo Corp., drilled approximately 12,500 m on uranium prospects within leases and claims in the Judge Sissons-Schultz Lake area (78). A gravity survey was completed on the new NOPQ claims and prospecting and an airborne EM survey were completed on the adjacent permit PP 1264.

Arctic Islands

Nanisivik Mines Ltd. drilled 11 holes totalling 1,975 m on the DEB claims (b), southeast of the Nanisivik mine. In addition, two holes totalling 202 m were drilled in the Shale Hill West area and 15 holes totalling 752 m were drilled in the Oceanview North area, located respectively north and northeast of the Nanisivik mine. The company also evaluated seismic surveys as an exploration tool for deep zinc-lead ore body targets in dolostone under thick shale cover. The preliminary results indicated that only moderate seismic penetration depths and delineation of seismic reflectors were achieved.

Noranda Exploration Ltd. conducted boulder prospecting and reconnaissance mapping in the Adams Sound area on Borden Peninsula, northwestern Baffin Island (79) and in the Hadley Bay area, northeastern Victoria Island (80). In 1991, Noranda drilled 19 holes totalling 2,400 m to test copper-silver prospects in sediments near Hadley Bay, as part of a joint venture program with Highwood Resources Ltd. and Aber Resources Ltd.

Cominco Ltd. explored for carbonate-hosted lead-zinc deposits in the Cornwallis-Truro lead-zinc district. The company drilled nine holes totalling 2,921 m on a lead-zinc showing on eastern Truro Island (81), which is near the Polaris mine on Little Cornwallis Island. Cominco also sponsored biostratigraphic studies of the Cape Phillips Formation, a thick shale package that overlies the ore horizon in the district. Graptolite zonation was successfully employed as a stratigraphic marker within the formation. The company also drilled its Rookery Creek leases on eastern Cornwallis Island (82).

Cyclone Capital Corp. staked claims and holds a 50 percent interest in the 87 Batty claims (83), covering known kimberlite diatremes on Somerset Island. The company held an option to acquire a 100 percent interest, subject to some back-in provisions, in all of Cominco Ltd.'s Somerset Island, Bathurst Island and Brodeur Peninsula diamond properties. Since 1983, Cominco has held a lease over the Selatiavak diatreme and single claims over a number of kimberlite diatremes on Somerset Island.

Cyclone Capital Corporation took four 22- to 31-kg samples from different diatremes on the Batty claim group, and took one sample from Cyclone's Peuyuk diatreme (83). Previous surface sampling of six of the 21 known kimberlite bodies, comprising the Batty group of kimberlites, identified kimberlite indicator minerals. The 1992 sampling identified indicator minerals, including some G-10 pyrope garnets. Breckenridge Resources Ltd. acquired an option to earn the remaining 50 percent interest in the Batty property.

In 1974 and 1975, Diapros sampled the Batty, Ham, Elwin and Peuyuk pipes. The samples indicated that some of the pipes were diamondiferous, but grades were all subeconomic. The Batty pipe yielded two small diamonds weighing 0.024 and 0.129 carats from about 145 t of kimberlite. Microprobe geochemical studies by Cyclone Capital Corporation suggested that two of the five pipes sampled and tested during 1992 are likely to be barren and the remaining three are likely to contain diamonds, although in subeconomic concentrations.

Galico Resources Inc. and International Impala Resources Ltd. acquired claims that cover a kimberlite pipe on Brodeur Peninsula, Baffin Island (84).

APPENDIX

The Mining Industry in Canada's Northern Territories

Introduction

The North is that 40 percent of Canada which is occupied by Yukon and the Northwest Territories. It covers an area of 3.86 million square kilometres with dimensions from east to west of 3 500 km and from north to south of 2 500 km.

Mining was established as a founding industrial-age economic activity in the North. It is now the leading industrial sector, accounting for over 30 percent of the value of goods and services produced in the North. The industry directly employs approximately eight percent of the employed work force. Mining's linkages to the transportation, electrical, construction and various service sectors are especially significant for the North's economy.

The population of the North in mid-1991 was 82 000 people. During the same year, the value of metals and construction material mined amounted to \$890 million or more than \$10 000 for every northern inhabitant. Petroleum and natural gas production, during 1991 in the Northwest Territories, accounted for an additional \$209 million. A substantial portion of the factor inputs consumed when producing hard minerals and metals are either imported from regions south of 60° latitude or are generated in the North as added value. The added value is derived from such inputs as labour, energy and services. The imported inputs include capital equipment such as shovels and trucks. The value of mineral production also includes the cost of shipping the mineral products or metal to markets and the cost of smelting and refining of mineral concentrates and gold bullion.

Geological Heritage

The landscape of the northern regions is a result of its long and rich geological history. The oldest identified rock in Canada lies in the Precambrian Shield of the Northwest Territories. It is 3.962 billion years old and is among the oldest rocks in the world. The Precambrian Shield, north of 60° latitude, extends north to the Arctic Islands and eastward from Great Bear Lake and Great Slave Lake to Hudson Bay and on to Baffin and Ellesmere Islands. The igneous, metamorphic and sedimentary rocks of the Shield range in age from more than three billion to less than one billion years old. The marine sediments in the youngest of these rocks contain the earliest fossil records of marine life.

The stratigraphic record extends from this late Precambrian era, as represented by Proterozoic sediments, nearly a billion years old, to the Quaternary glacial sediments, between 10,000 and several thousand years old. The sedimentary rock formations and glacial deposits faithfully record their depositional environment. Their fossil record and stratigraphic characteristics are used to correlate rocks across distances of hundreds of miles.

The last continental ice sheet retreated from the Northwest Territories and Yukon several thousand years ago, leaving an extensive glacial landscape. Scoured lakes, esker ridges, moraine hills, raised beaches and coastal fiords were formed. Post-glacial sediments have formed modern land forms, such as river deltas and pingos. Glaciation played a major role in the North's mineral development. The continental ice sheet exposed some of the primary mineral deposits in the Shield areas by removing the soil cover. Other mineral deposits were covered by extensive glacial deposits and can only be found by employing geophysical or geochemical surveys, or both, followed by drilling of the anomalous targets.

Recently, diamond-bearing kimberlite pipes have been located near Lac de Gras, north of Yellowknife, Northwest Territories, by localizing the source area of the kimberlite rock mineral constituents that had been transported by glaciers during the Pleistocene age and deposited in lodgment till, beach sands and esker ridges. A number of the kimberlite pipes were first targeted by employing airborne magnetic and electromagnetic geophysical surveys to identify magnetic and conductive areas (anomalies) in the ground.

Some parts of the North, such as the famous Klondike area near Dawson, Yukon, were not glaciated during the last ice age. The deep weathering of rocks in the early Tertiary period, 26 to 53 million years ago combined with an uplift of the land area in the late Tertiary, less than 26 million years ago, led to the concentration of rich gold deposits by streams within gravel deposits in deep narrow canyons. Beyond the limits of the non-glaciated area in Yukon, glaciation either destroyed or covered many of these gold deposits. Some of the deposits have been found in deep canyons, where gold-bearing gravels are overlain by glacial sand, gravel and clay deposits that appear higher on the banks of the stream valley.

History of the Earliest Mining

Before European explorers arrived in the North, Indigenous Inuit and Indian people mined and traded native copper derived from the Coppermine, Victoria Island and Bathurst Inlet areas of the Northwest Territories and the White River area, Yukon, near the Yukon-Alaska border.

In the Northwest Territories, the first European mining took place more than four centuries ago (1577-1578) when Sir Martin Frobisher mined and shipped some 2 000 tonnes of so-called "black stone" from the now famous "gold" mine on Kodlunarn Island, on the east side of Frobisher Bay, southern Baffin Island region. The pits were rediscovered 300 years later by C.F. Hall. The worthless barren rock taken to England by Frobisher was believed to contain gold according to the alchemists at that time. But neither the bedrock of the rediscovered pits nor museum samples of the black stone in England contain gold. Nonetheless, Frobisher has the distinction of being the chronicler of the first attempt to mine gold in the North. While in search of China via the Northwest Passage, Frobisher also formed the first northern mining company, called "a Company of Cathay" under charter from Queen Elizabeth I.

In 1771, Samuel Hearne, a clerk with the Hudson's Bay Company and his remarkable Indian guide, Matonabee, set out from Churchill on Hudson Bay. It was Hearne's third attempt to locate the legendary mountain of copper in the Coppermine River area. Hearne's party wandered 8 000 km on a year-and-a-half journey, mostly on foot, to find what he described as "no more than an entire jumble of rocks and gravel" at Coppermine Mountain, near the Coppermine River. The copper occurrences and small pieces of native copper float seen by Hearne were of little commercial interest to the Hudson's Bay Company. These showings were later mentioned by a number of explorers who passed through the region. In 1966, the area was the object of a large staking rush and intensive exploration activity. None of the several copper deposits that were outlined during this period were commercially feasible because of the high costs related to the remoteness of the region.

In 1896, the mineral industry in the North was permanently established when the news of the Klondike gold discovery in Yukon first reached the outside world. The discovery, near Dawson, Yukon, was made by George Carmack, Skookum Jim and Tagish Charlie on Rabbit Creek. The creek was later renamed Bonanza Creek. By summer 1898, over 40 000 stampedeers had reached the gold field, and by the turn of the century, the Klondike was established as one of the great placer gold fields of the world. Currently, over 100 placer operations produce gold in the Yukon on a seasonal basis.

In the Northwest Territories, the mining industry did not become established until 1930, when Gilbert A. LaBine and E. Charles St. Paul staked a cobalt-silver-uranium-bearing vein on McTavish Arm on the east side of Great Bear Lake. This property became the Eldorado mine, and operated as a radium-silver mine between 1933 and 1940, as a uranium mine between 1942 and 1960, and as a silver mine between 1964 and 1982.

The Yellowknife gold camp was firmly established in 1938, when the Consolidated Mining and Smelting Company Ltd. (now Cominco Ltd.) started production at the Con mine. Yellowknife's second gold mine, the Giant mine, entered production in 1948. Except between 1943 and 1946 when the Con mine was closed, both the Con and Giant mines have remained in continuous production over the decades.

Table 9: Placer Mining, Mines and Mining Exploration Projects, Yukon, 1992

Location	N.T.S.	Property/CLAIM(S)/Area	Company
1	115 O	INDIAN RIVER	Placer mining area
2	115 N, O	KLONDIKE	Placer mining area
	116 B, C	KLONDIKE	Placer mining area
3	116 B, C	SIXTY MILE, FORTY MILE RIVERS	Placer mining area
4	115 N, O	LOWER STEWART RIVER	Placer mining area
5	105 M	MAYO	Placer mining area
6	115 P	CLEAR CREEK	Placer mining area
7	115 I	DAWSON RANGE	Placer mining area
8	105 E	LIVINGSTONE CREEK	Placer mining area
9	115 I	WILLIAMS CREEK	Western Copper Holdings
10	106 D	BLENDE	Billiton, NDU Resources
11	105 L	CLEAR LAKE	Total Energold, Mitsui
12	105 B	DAN	Yukon First Silver
13	115 F	AZ	Noranda
14	105 G	LYNX	Cominco
15	105 F	FIN	Cominco
16	106 D	NICK	Falconbridge, NDU
17	105 I	FALCON	Falconbridge, NDU
18	105 O	JET	Falconbridge, NDU
19	106 E	BOND	BHP Minerals
20	106 D	IGOR	BHP Minerals
21	115 N	BOR	Kennecott YGC
22	116 C	MICKEY	Kennecott
23	116 C	BAL	Kennecott
24	105 F	MATHEW	Granges
25	115 J	CASINO	Big Creek Resources
26	116 B	BREWERY CREEK	Loki, Hemlo Gold
27	106 D	DUBLIN GULCH	Amax Gold
28	115 P	SCHEELITE DOME	H-6000 Holdings
29	115 O	LONESTAR	Kennecott
30	115 O	TRAIL HILL	Carmacks Gold
31	115 P	RUM, RYE	Noranda
32	105 D	ROB	Adda Minerals
33	115 I	GOULTER	Aurchem Expl.
a	105 K	FARO & VANGORDA MINES	Curragh Inc.
b	105 A	SA DENA HES MINE	Curragh Inc., Hillsborough Resources
c	105 H	KING ARCTIC JADE	Max Rosequist

**Table 10: Mines and Mining Exploration Properties,
Northwest Territories, 1992**

Location	N.T.S.	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company
1	77 A	MADRID, SANTIAGO	BHP Minerals
2	76 O	HAVANNA	BHP Minerals
3	76 O	BOSTON	BHP Minerals
4	76 M	HIGH LAKE	Aber Resources
5	76 M	BAMAKO	BHP Minerals
6	76 L	ULU and other claims	BHP Minerals
7	86 P	TR	Noranda
8	86 I	HOOD	Minnova, Metall
9	76 B	ROYAL	BHP Minerals
10	76 G	BRAU	Black River Jt. Venture
11	76 G	MUSK	Kingswood, Noranda
12	76 E	SKI	Echo Bay
13	76 E	DIGGER	Contwoyto Goldfields, Kingswood
14	86 H	IZOK	Minnova, Metall
15	76 E	GONDOR	Minnova, Metall
16	76 E	BHP Minerals/Dia Met Property	BHP, Dia Met
17	76 C	AB	BHP, Dia Met
18	76 C,D	Monopros Property	Monopros
19	86 A	Monopros Property	Monopros
20	86 A	Aaron Oil Property	Aaron Oil, Monopros
21	76 E	Tanqueray, Fibre-Clad Property	Tanqueray, Fibre-Clad
22	76 C,F	Diavik Project	Kennecott et al
23	76 D	Diavik Project	Kennecott et al
24	75 N	Kalahari et al Property	Kalahari et al
25	76 M	Kalahari et al Property	Kalahari et al
26	76 C	DHK Property	DHK
27	76 C	KRL Property	KRL Resources
28	76 C	Totem Health Property	Totem Health Sciences
29	76 D	AMAD	Teryl, Calco Resources
30	76 D	AB	Bellex Mining
31	76 C	S	Bellex Mining
32	76 D	AD	Layfield Resources

**Table 10: Mines and Mining Exploration Properties,
Northwest Territories, 1992 (Continued)**

Location	N.T.S.	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company
33	86 A	DEST	Winspear
34	76 D, 86 A	JL	Winspear
35	76 D	CL	Winspear
36	86 A	Snare Lake Property	Winspear
37	76 E	GH	Tyler, Golden Rule
38	76 C, 75 N	AC	Tyler, Golden Rule
39	86 H	ICE	Lytton Minerals
40	75 O	Pure Gold Option	Pure Gold
41	86 A	Pure Gold Option	Pure Gold
42	76 C	DA	Intertech, Canamera Expl.
43	76 B	Gerle Properties	Gerle Gold
44	86 G, 86 H	PL, JC	Texas Star
45	76 E	JOHN, SHIN, DLER	Acadia, Kingswood
46	75 N	AK, CJ	Mountain Province
47	76 C	Barexor Property	Barexor
48	86 B	HELA, TAIGA-TUTGIK	BHP Minerals
49	85 J	BONE	D. Smith
50	85 P	NICHOLAS	Athabasca Gold
51	85 J	QUYTA, RICH	W. Humphries, D. Smith
52	85 J	MON	Ger-Mac Expl.
53	85 J	Walsh Lake, North Belt Claims	Savoy, Nebex, Royal Oak
54	86 F	HORDEL	H. Arden
55	86 O	PP 1267-1271	Cominco
56	76 C	Kennecott Options	Kennecott et al
57	76 B	Kennecott Options	Kennecott et al
58	75 A	Scott Lake Area	R. C. Day
59	75 I	BOOMERANG	PNC Exploration
60	75 L	BBX	Sandy Lake Expl.
61	85 J	Chedabucto Lake Area	Cominco
62	95 R	PRAIRIE CREEK	San Andreas
63	106 A	Mountain Diatreme	Island Arc et al
64	55 J,K,N,O	NAT	Asamera, Comaplex

**Table 10: Mines and Mining Exploration Properties,
Northwest Territories, 1992 (Continued)**

Location	N.T.S.	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company
65	55 N	Western Lands Area	Rio Algom, Asamera, Comaplex
66	55 M	PP 1294-1295	Comaplex
67	65 G,H	PP 1297-1299	Comaplex
68	65 C	PP 1296	Comaplex
69	55 M	PP 1273, 1278, 1279	Comaplex
70	65 G,H	PP 1233-1237	Comaplex
71	65 C	PP 1276-1277	Comaplex
72	65 C	MOON, DAWN	Homestake
73	65 D	SUN	Homestake
74	65 N	Dubawnt Lake Property	Leeward Capital
75	55 E, 65 H,I	MAG, PAP, TIL, TURQ	MH
76	55 K	MAZE	Outpost
76	55 L	MJ, BUCK	Noble Peak,
77	55 L	MG, MJ	Placer Dome, Noble Peak
78	65 A, 66 B	Jungle Sissons-Schultz Lake Area	Urangesellschaft et al
79	48 B	Adams Sound Area	Noranda
80	77 G, 86 B	Hadley Bay Area	Noranda
81	68 H	Truro Island Area	Cominco
82	58 G	Cornwallis Island	Cominco
83	58 B,C,D	Somerset Island	Cyclone Capital
84	58 D	Brodeur Peninsula	Galico,Int.Impala
a	68 H	POLARIS MINE	Cominco Ltd.
b	48 C	NANISIVIK MINE	Nanisivik Mines Ltd.
c	76 E	LUPIN MINE	Echo Bay Mines
d	85 J	NERCO CON MINE	Nerco Minerals Company
e	85 J	GIANT MINE	Royal Oak Mines Ltd.
f	85 J	PTARMIGAN and TOM MINES	Tremenco Resources Ltd.

Table 11: Mineral Production, Yukon, 1983-1992

Mineral		1983	1984	1985	1986	1987	1988	1989	1990	1991 (R)	1992 (P)
Gold	\$ kg	50 337 000 3 006	44 419 000 2 960	42 669 000 3 065	58 237 000 3 547	88 970 000 4 674	87 386 000 5 052	80 070 000 5 652	66 731 000 4 639	51 573 000 3 865	50 747 000 3 831
Silver	\$ kg	6 891 000 15 000	18 825 000 54 000	13 098 000 47 000	18 468 000 73 000	40 965 000 133 000	42 593 000 159 000	14 851 000 71 000	15 177 000 84 000	12 890 000 87 000	17 800 000 118 000
Lead	\$ kg	307 000 520 000	1 539 000 2 083 000	848 000 1 470 000	23 893 000 135 091 000	105 982 000 100 267 000	118 696 000 117 058 000	98 310 000 94 529 000	124 704 000 104 181 000	79 825 000 93 912 000	91 295 000 125 924 000
Copper	\$ kg	3 977 000 1 904 000		19 000 10 000	13 000 6 000	22 000 9 000					
Zinc	\$ kg	31 000 27 000	244 000 173 000	137 000 109 000	61 521 000 50 634 000	187 336 000 147 045 000	237 932 000 143 939 000	332 934 000 154 709 000	325 366 000 168 846 000	191 194 000 149 487 000	302 804 000 209 263 000
Antimony	\$ kg							11 000 4 000	3 000 1 000	2 000 1 000	X X
Bismuth	\$ kg		2 000 162	11 000 1 000	5 000 541	2 000	2 000	12 000 1 000		2 000 N/A	1 000 N/A
Cadmium	\$ kg	6 000 2 000	9 000 2 000	5 000 1 000	8 000 2 000	13 000 2 000	62 000 3 000	8 000 1 000		N/A N/A	X X
Sand and Gravel	\$ t	1 438 000 480 000	5 105 000 3 074 000	2 995 000 1 185 000	13 355 000 4 902 000	1 502 000 352 000	5 184 000 2 246 000	5 675 000 2 367 000	9 833 000 2 113 000	5 214 000 1 441 000	5 223 000 1 691 000
Sulphur (smelter gas)	\$ t			267 000 2 000	1 000 7	156 000 1 000	183 000 2 000	39 000 N/A		3 000 N/A	
Coal (E)	\$ t				209 000 17 223	440 000 20 000	100 000 10 000	420 000 40 000			
Stone	\$ t					679 000 206 000					
TOTAL	\$	62 987 000	70 143 000	60 069 000	176 310 000	426 027 000	492 299 000	532 330 000	541 814 000	340 703 000	467 871 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Environment Branch, Indian Affairs and Northern Development.
(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential, (N/A) Not available

Table 12: Mineral Production, Northwest Territories, 1983-1992

Mineral	1983	1984	1985	1986	1987	1988	1989	1990	1991 (R)	1992 (P)
Gold	\$ 144 570 000 kg 8 634	191 071 000 12 713	177 079 000 12 713	205 266 000 12 503	223 456 000 11 740	205 503 000 11 880	177 260 000 12 208	223 788 000 15 557	222 504 000 16 752 000	182 773 000 13 799 000
Silver	\$ 33 743 000 kg 74 000	20 361 000 59 000	9 083 000 33 000	5 478 000 22 000	4 006 000 13 000	6 923 000 26 000	3 820 000 18 000	3 457 000 19 000	2 524 000 17 000	3 526 000 23 000
Copper	\$ 214 000 kg 102 000	130 000 69 000	46 000 23 000	1 000 1 000	4 000 2 000	3 000 1 000				
Lead	\$ 47 981 000 kg 81 161 000	66 647 000 90 198 000	44 489 000 77 083 000	91 129 000 133 836 000	139 370 000 131 744 000	52 223 000 51 502 000	41 323 000 39 734 000	55 766 000 46 588 000	30 080 000 35 388 000	28 377 000 39 140 000
Zinc	\$ 269 951 000 kg 234 883 000	386 813 000 274 920 000	356 415 000 284 223 000	322 064 000 265 073 000	328 781 000 258 070 000	537 756 000 325 321 000	708 009 000 329 001 000	420 550 000 218 241 000	221 464 000 173 154 000	261 484 000 180 708 000
Cadmium	\$ 10 000 kg 3 000	1 034 000 214 000	866 000 238 000	670 000 175 000	501 000 86 000	3 172 000 166 000	4 405 000 269 000	266 000 31 000		
Bismuth	\$ 163 000 kg 32 000	34 000 3 000	60 000 3 000							
Antimony	\$ kg				141 000 44 000	55 000 19 000	43 000 18 000	6 000 3 000		
Tungsten Trioxide (E)	\$ 11 221 000 t 1 126 000	33 584 000 3 112 000	38 918 000 3 529 000	17 363 000 2 470 000						
Arsenious Trioxide (E)	\$ 2 345 000 t 982	5 837 000 4 684	1 969 000 4 098	254 000 406	666 000 X	2 366 000 X	1 286 000 X	240 000 X		
Sulphur (Smelter gas)	\$ t		11 665 000 147 000	21 788 000 59 000	6 912 000 6 000	7 286 000 73 000	8 468 000 67 000	2 677 000 17 000		
Sand and Gravel	\$ 32 479 000 t 5 905 000	36 323 000 7 249 000	8 981 000 6 803 000	3 281 000 986 000	8 132 000 2 183 000	10 966 000 2 443 000	11 813 000 2 203 000	13 856 000 3 274 000	6 739 000 1 824 000	3 390 000 1 217 000
Stone	\$ 14 601 000 t 2 409 000	4 617 000 729 000	434 000 163 000	1 011 000 368 000	1 486 000 472 000	232 000 108 000	4 344 000 727 000	9 079 000 1 495 000	4 788 000 1 003 000	3 368 000 757 000
TOTAL	\$ 557 278 000	746 451 000	650 005 000	668 305 000	713 455 000	826 485 000	960 771 000	729 685 000	488 099 000	482 918 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Environment Branch, Indian Affairs and Northern Development.
(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential, (N/A) Not available





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INTRODUCTION

This report covers the activities of the mines and minerals sector of Yukon and the Northwest Territories during the calendar year 1993.

The report was written by **T.W. Caine, Mineral Resources Directorate**, Department of Indian Affairs and Northern Development (DIAND), Ottawa. The mineral exploration sections are based on the 1993 mining exploration overviews produced by DIAND regional staff under the direction of S.R. Morison*, Chief Geologist, Exploration and Geological Services Division, Northern Affairs Program in Whitehorse, Yukon and W.A. Padgham, Chief Geologist, NWT Geology Division, Northern Affairs Program in Yellowknife, Northwest Territories.

The report 'World and Lac de Gras Diamond Overviews', presented in the Appendix, was written by **D.D. Brown, Mineral Resources Directorate**, Department of Indian Affairs and Northern Development, Ottawa.

* S.R. Morison was replaced by G. Abbott in early 1994 as Chief Geologist.

SUMMARY

Yukon

The value of minerals produced in Yukon was estimated at \$117.4 million in 1993 compared with \$478.0 million in 1992. The only hard rock mining operations in 1993 were Curragh Inc.'s Faro and Vangorda zinc-lead-silver mines, in the Faro area and the King Arctic jade mine, north of Watson Lake. Operation of the Sa Dena Hes mine, jointly owned by Curragh Inc. and Hillsborough Resources Ltd., was suspended in December 1992 because of high inventories and low zinc and lead prices. Milling and shipping of concentrates at Curragh's Faro mill were continued into April 1993 despite a similar decision at Sa Dena Hes to suspend mining operations. The zinc and lead production of the Faro mill represented 47 percent of the total value of Yukon mineral production in 1993.

Placer gold production reported for royalty payments in 1993 increased by 6.6 percent to reach 3 388.6 kg of crude gold from the previous year's amount of 3 177.3 kg of crude gold. Some 185 placer operations were active in 1993, the same number as in 1992 compared with 219 in 1991. Gold from placer operations accounted for 43 percent of the value of Yukon's 1993 mineral production.

Exploration expenditures in 1993 showed a 95 percent increase to \$19.5 million, from \$10 million the previous year. Much of the 1993 expenditures focused on the delineation of porphyry copper deposits on the Casino and Williams Creek properties in the Dawson Range and the delineation of bulk-tonnage, low-grade gold deposits on the Brewery Creek and Lonestar properties, near Dawson, and the Dublin Gulch and Newry properties, near Mayo.

Northwest Territories

The value of minerals produced in the Northwest Territories was estimated at \$403 million in 1993 compared with \$482 million in 1992. Mineral production was derived from five gold mines and two zinc-lead mines. Gold accounted for 47.8 percent of the mineral production value and zinc-lead accounted for 48.3 percent.

The bitter labour strike, which began in May 1992 at Royal Oak Mines Inc.'s Giant gold mine in Yellowknife ended after the Canada Labour Relations Board, on November 11, 1993, ordered the two sides to resume negotiations based on the tentative agreement that the union had rejected in April 1992. The majority of striking workers voted to accept the contract offer and returned to work.

In 1993, exploration expenditures in the Northwest Territories were reported to be \$75 million, compared with approximately \$38 million in the previous year. The staking rush started by the discovery of the Point Lake diamondiferous kimberlite pipe near Lac de Gras, in November 1991 continued in 1993 with over 11.8 million hectares (ha) being staked plus 2.9 million ha issued as prospecting permits. Several major companies and a number of junior mining companies explored for diamonds by conducting soil sampling for kimberlite indicator minerals, contracting airborne geophysical surveys, and drilling. At least 95 targets were drilled.

Over 260 000 m of drilling was completed in 1993. This was the highest level since 1979, with 85 percent of the drilling in the Slave Structural Province in the exploration for diamonds, gold and base metals. The main commodities sought in the Arctic Islands (6 percent of drilling) were base metals and diamonds and in Keewatin (5 percent of drilling), targets were predominately uranium.

Diamond explorers have now discovered at least 138 kimberlite or lamproite bodies in the Northwest Territories.

Diamond explorers indicated that at least four diamond-bearing kimberlite pipes would be bulk sampled during the winter of 1993-1994. BHP Minerals Canada Ltd. and Dia Met Minerals Ltd. started to drive a decline adit into Pipe 4 (Koala) and will bulk sample Pipe 3 (Fox) by large-diameter reverse circulation drilling. The test samples of 3 500 to 5 000 tonnes (t) will be processed at a heavy-media separation plant that was assembled on the property as part of a 112-person camp. Dia Met will conduct a large-diameter drilling program on a number of promising targets discovered in 1993. Kennecott Canada Inc. has begun an underground bulk sampling program on the Tli Kwi Cho pipe on the DHK property. The 5 000 t sample will be processed at a plant constructed on the Con Mine property in Yellowknife.

Exploration for polymetallic massive sulphide deposits in the northern half of Slave Structural Province continued. Metall Mining Corp., having purchased its partner Minnova Inc. in May 1993, completed a large drilling program on the Izok Lake zinc-copper-silver property in an effort to delineate mine reserves at the Izok and Inukshuk deposits. Metall also evaluated the Gondor, Hood River and High Lake deposits and explored areas along the proposed road to the Coronation Gulf. Despite shelving the project due to poor world base metal prices and financial problems with its parent company, Metall Mining is partially funding hydrographic surveys of proposed shipping routes to the Coronation Gulf.

SOMMAIRE

Yukon

La valeur des minéraux extraits au Yukon a été évaluée à 117,4 millions de dollars en 1993, comparativement à 478 millions de dollars en 1992. L'exploitation de mines métalliques en roche dure en 1993 s'est limitée aux mines de zinc, d'argent et de plomb Curragh Inc. de Faro et de Vangorda, situées dans la région de Faro, et à la mine de jade King Arctic, au nord de Watson Lake. L'exploitation de la mine Sa Dena Hes, propriété conjointe de Curragh Inc. et de Hillsborough Resources Ltd. a été interrompue en décembre 1992 en raison de ses stocks élevés et de la faiblesse des prix du zinc et du plomb. À l'usine Faro de la société Curragh, le traitement et l'expédition de concentrés se sont poursuivis jusqu'en avril 1993 bien qu'une décision semblable à la Sa Dena Hes ait été prise de suspendre les opérations minières. Le zinc et le plomb en provenance des installations de Faro représentaient 47 % de la valeur totale de la production minérale du Yukon en 1993.

La production de placers déclarée aux fins du paiement des redevances en 1993 a augmenté de 6,6 % pour atteindre 3 388,6 kg d'or brut, par rapport à 3 177,3 kg l'année précédente. Quelque 185 travaux d'exploitation des placers étaient en cours en 1993 tout comme en 1992, contre 219 en 1991. L'or provenant des placers représentait 43 % de la valeur de la production minérale du Yukon en 1993.

En 1993, les dépenses liées à la prospection ont affiché une augmentation de 95 % pour atteindre 19,5 millions de dollars, soit 10 millions de dollars de plus que l'an dernier. La plupart des dépenses ont été consacrées à la délimitation des gisements de porphyre cuprifère des concessions de Casino et de Williams Creek, dans le rang Dawson, et à la délimitation des gisements d'or pauvre calculés en tonnage global des concessions de Brewery Creek et de Lonestar, près de Dawson et des concessions de Dublin Gulch et de Newry, près de Mayo.

Territoires du Nord-Ouest

La valeur des minéraux extraits dans les Territoires du Nord-Ouest a été estimée à 403 millions de dollars en 1993, comparativement à 482 millions de dollars en 1992. La production minérale provenait de cinq mines d'or et de deux mines de zinc et de plomb. La production d'or représentait 47,8 % de la production minérale et celle de zinc et de plomb, 48,3 %.

La dure grève, qui a commencé en mai 1992 à la mine Giant exploitée par Royal Oak Mines Inc., près de Yellowknife, a pris fin après que le Conseil canadien des relations du travail, le 11 novembre 1993, ait ordonné aux deux parties de reprendre les négociations en partant du projet d'entente que le syndicat avait rejeté en avril 1992. La majorité des travailleurs en grève ont voté en faveur de l'acceptation de l'offre et sont retournés au travail.

En 1993, on a signalé dans les Territoires du Nord-Ouest des dépenses de prospection de l'ordre de 75 millions de dollars, comparativement à environ 38 millions de dollars l'année précédente. La ruée sur le jalonnement provoquée par la découverte d'une cheminée de kimberlite diamantifère à Point Lake, près du Lac de Gras en novembre 1991, s'est poursuivie en 1993, plus de 11,8 millions d'hectares ayant été jalonnés, sans compter les 2,9 millions d'hectares ayant fait l'objet de permis de prospection. De grandes compagnies minières et quelques nouvelles autres de moindre envergure ont mené des travaux de prospection de diamants; elles ont prélevé des échantillons de sol à la recherche d'indices de kimberlite, ont fait effectuer à contrat des levés géophysiques aériens et ont procédé à des forages. Des forages ont été menés en au moins 95 endroits.

Plus de 260 000 mètres de forage ont été effectués en 1993. Il s'agit du niveau le plus élevé depuis 1979, 85 % des forages étant faits dans la province structurale des Esclaves à la recherche de diamants, d'or et de métaux communs. Les principaux éléments recherchés dans l'archipel Arctique (6 % des forages) étaient les métaux communs et les diamants tandis que dans le Keewatin (5 % des forages), on recherchait avant tout de l'uranium.

Les prospecteurs de diamants ont maintenant découvert au moins 138 veines de kimberlite ou de lamproïte dans les Territoires du Nord-Ouest.

Les prospecteurs de diamants ont indiqué qu'au moins quatre cheminées de kimberlite diamantifère feraient l'objet d'échantillonnage massif au cours de l'hiver 1993-1994. BHP Minerals Canada Ltd. et la Dia Met Minerals Ltd. ont commencé à percer un puits incliné en direction de la cheminée n° 4 (Koala) et entreprendront l'échantillonnage massif de la cheminée n° 3 (Fox) en procédant par forages à circulation inverse de grand diamètre. On traitera de 3 500 à 5 000 tonnes d'échantillons à l'usine de concentration par milieu dense qui a été assemblée dans la concession et qui fait partie d'un campement de 112 personnes. Dia Met exécutera un programme de forages de grand diamètre dans divers emplacements prometteurs découverts en 1993. Kennecott Canada Inc. a commencé un programme d'échantillonnage massif souterrain à la cheminée Tli Kwi Cho dans la concession de DHK. Le traitement de 5 000 tonnes d'échantillons se fera à une usine construite dans la concession de Con Mine, à Yellowknife.

La prospection des gisements de sulfure massif polymétallique dans la moitié nord de la province structurale des Esclaves s'est poursuivie. La Metall Mining Corp., après s'être portée acquéreur de sa partenaire, Minnova Inc., en mai 1993, a terminé un important programme de forage dans la concession de cuivre, de zinc et d'argent d'Izok Lake afin de délimiter les réserves des gisements d'Izok et d'Inukshuk. Metall Mining a également évalué les gisements de Gondor, de Hood River et de High Lake et exploré des secteurs le long de la route projetée en direction du golfe Coronation. Bien qu'elle ait été forcée de mettre le projet de côté à cause des faibles cours mondiaux des métaux communs et des problèmes financiers de la compagnie mère, Metall Mining finance en partie des levés hydrographiques le long des itinéraires proposés vers le golfe Coronation.

Yukon

Mineral Production

The only hard rock mill/mines to operate in the Yukon were one base metal mill and one small jade mine. Approximately 185 placer mines operated.

The value of mineral production in Yukon during 1993 was estimated at \$117.4 million compared with \$478.0 million in 1992. Curragh Inc.'s Faro and Vangorda mines in the Faro area and the Sa Dena Hes mine in the Watson Lake area were closed in December 1992 due to high mineral inventories, poor metal prices and the poor financial condition of Curragh Inc. The Faro mill continued to process stockpiled ore until it was closed on April 3, 1993. The value of lead and zinc was estimated at \$55.6 million or 47 percent of the total mineral production of Yukon in 1993.

Gold production from Yukon's placer mine operations was the second largest source of mineral produced in 1993. Placer gold production reported for royalty payments was 3 388.6 kg of crude gold in 1993, an increase of 6.6 percent from the 3 177.3 kg of crude gold reported in 1992. The value of Yukon gold production is estimated to be \$50.43 million or 43 percent of the total Yukon mineral production.

Exploration expenditures in 1993 increased 95 percent to \$19.5 million from \$10 million in the previous year. Much of the exploration expenditures focused on several advanced projects. These include the Casino and Williams Creek porphyry copper deposits in the Dawson Range, northwest of Carmacks, the large-tonnage, low-grade gold Brewery Creek and Lonestar properties, near Dawson City and the Dublin Gulch and Newry properties, near Mayo.

Yukon's hard rock mining operations in Faro employed 131 people in early 1993. This dropped to 12 by mid-year. Yukon's placer mine operations employed an estimated 650 people during the placer mining season.

Yukon accounted for 2 percent of the gold, 3 percent of the zinc and 14 percent of the lead produced in Canada during 1993. Yukon's 1993 metallic mineral production value, \$111 million, amounted to 1.3 percent of the total value of Canada's 1993 metallic mineral production. This compares with 4.6 percent in 1992 and 3.2 percent in 1991.

Mineral production statistics for Yukon for 1984-1993 are given in Table 11.

Mines

Curragh Inc., Faro and Vangorda Mines

In the first quarter of 1993, the Faro mill (a)* produced 113 247 t of concentrates containing 30 275 t of zinc metal and 23 240 t of lead metal from 1.07 million t of ore. This compares with 503 300 t of zinc and lead concentrates produced in 1992 from 4.55 million tonnes of ore. Feed for the Faro mill was supplied from stockpiled ore following the suspension of mining on December 20, 1992. Concentrate production ceased at the Faro mill on April 3, 1993 due to exhaustion of stockpiled mineralization.

Early in 1993, Curragh Inc. announced that at current metal prices, the company could not generate sufficient cash from operations to fund the expenditures necessary to develop the Grum ore deposit. It is estimated that three more months of stripping of waste rock are required before production can begin. Development of the Grum ore deposit was suspended on December 20, 1992.

On March 10th, Curragh Inc. was offered a \$34 million loan guarantee by the Yukon Territorial Government conditional upon 14 items, the main one being able to raise further equity. Unable to find investors, Curragh filed for protection from its creditors under the Companies' Creditors Arrangement Act on April 5. At the end of March, Curragh owed its creditors over \$315 million. In early September, Curragh's assets were placed in receivership.

The Department of Indian Affairs and Northern Development has funded the Interim Receiver for the Faro Mine from the beginning of September 1993 to mothball the mill and pay for environmental maintenance while a potential buyer for the assets was sought.

Faro Area Mines: Faro and Vangorda Mines

Type:	underground and open pit at Faro, open pit at Vangorda
Location:	Faro mill is 14 km north of Faro and Vangorda mine is 7 km east-northeast of Faro
Product:	zinc, lead, silver, gold
Mill Capacity:	13 500 tpd
Tonnes Milled:	1.072 million t
Ore Reserves:	Faro & Vangorda 3.5 million t (December 31, 1992) Stockpile 1.16 million t (December 31, 1992) Grum 24.76 million t (December 31, 1992)
Ore Reserve Grade:	Faro & Vangorda 4.31% zinc, 2.52% lead, 33 g/t silver Stockpile 3.49% zinc, 2.76% lead, 18 g/t silver Grum 4.34% zinc, 2.74% lead, 38 g/t silver
Employees:	131 (March 1993)

* Numbers or letters in parenthesis indicate the location of the property on Map 1.

Table 1: Mineral Production of Operating Mines, Yukon, 1991, 1992 and 1993

Company, Mine and Commodity	1991		1992		1993(P)	
	t	kg	t	kg	t	kg
Curragh Inc.						
Faro and Vangorda Mines						
zinc	135 535 ¹		177 793 ¹		30 275	
lead	101 901 ¹		136 896 ¹		23 240	
silver		N/A		N/A		N/A
Teck Corp. and Cominco Ltd.						
Sa Dena Hes Mine						
zinc	N/A		N/A		NIL	
lead	N/A		N/A		NIL	
silver		N/A		N/A		NIL

Source: Department of Indian Affairs and Northern Development. These figures are reported by the mines as production and will not match Statistics Canada's production figures based on metals sold or shipped.

(P) = Preliminary N/A = Not Available (1) includes production from Sa Dena Hes in 1991 and 1992

Teck Corp. and Cominco Ltd., Sa Dena Hes Mine

The mine closed on December 2, 1992 because of unprofitable zinc and lead metal prices. Hillsborough Resources Ltd. wrote off its investment in the mine at the end of 1992.

On December 15, 1993 an agreement was reached by a consortium consisting of Teck Corp. (25 percent), Cominco Ltd. (25 percent), Korea Zinc Co. Ltd. (40 percent) and Samsung Corp. (10 percent) to offer to purchase the Sa Dena Hes zinc-lead mine (b) from the receiver appointed by Curragh's creditors. The \$70-million project near Watson Lake started underground production in July 1991 and the mill on August 1, 1991. During 1992, Sa Dena Hes produced 127 000 t of zinc and lead concentrate from 527 000 t of ore. This compares with 44 998 t of zinc and lead concentrate produced in 1991.

The sale, to Cominco Ltd. and Teck Corporation for \$21 million, was approved on February 28, 1994. Korean Zinc Co. Ltd. was granted the right to acquire a 50 percent interest in the mine. Cominco and Teck will re-evaluate the mine's reserves. The property has good exploration potential for increasing

reserves. Cominco officials have said that the mine will reopen when base metal prices improve.

Type:	underground
Location:	45 km north of Watson Lake
Product:	zinc, lead, silver
Mill Capacity:	1 100 tpd
Tonnes Milled:	nil
Reserves:	1.75 million t (December 31, 1992)
Reserves Grade:	3.4 percent lead, 12.1 percent zinc, 52 g of silver per t
Employees:	nil

Seasonal Mine Operations

The KING ARCTIC property (c) of Yukon Jade Ltd. continued to produce nephrite jade in the Frances Lake area, north of Watson Lake. Exploration and mining of jade are conducted during the summer months.

Placer Mining

Placer gold production, reported by royalty payments in 1993, increased by 6 percent to 3 388.6 kg of crude gold compared with 3 143.3 kg in 1992. The average price of gold in Canadian dollars was \$460 a troy ounce in 1993 compared to \$395 a troy ounce in 1992 and \$416 a troy ounce in 1991. The higher gold price; temporarily reversed the decline in placer gold production. The 1993 season saw 185 operations (1 to 8 on Yukon map) either overburden stripping or sluicing, the same as in 1992 compared to 219 operations in 1991.

Advanced Exploration and Development

In the Dawson range, **Western Copper Holdings Ltd.** (50 percent) and joint venture partner, **Thermal Exploration Company** (50 percent), completed an extensive exploration program on the WILLIAMS CREEK (29) oxide-copper-gold property. The tabular deposit is oxidized to a depth of 240 m along its 395 m strike length. New reserves to a depth of 197 m in the Main zone, the largest of 13 zones on the property, amount to 10.52 million t grading 1.08 percent copper and 0.34 g of gold per t at a strip ratio of 2.8 to one. The proposed open-pit mine development would use a heap-leach, solvent-extraction process followed by electrowinning to produce copper ingots. The 1993 program included the start of a feasibility study, bulk sampling from trenches and pre-permitting of the project.

A pilot heap-leach and electrowinning plant was built at Carmacks. A 250-t sample was crushed and heap-leached beginning in September into the winter. Over 360 kg of cathode copper was produced to the end of October. The heap-leach uses sulphuric acid to leach the copper oxides from the mineralized rock. A chemical reaction releases heat which allows the process to be used under winter conditions such that even when outside temperatures were -12°C, the heap was 20°C due to the chemical reaction (a difference of 32°C).

Pacific Sentinel Gold Corporation drilled 50 316 m in 127 holes on its CASINO (27) property. This was the largest and most expensive exploration project in the Yukon, accounting for almost half of the money spent on exploration in the territory. In addition, the company carried out engineering studies on gravel for construction of foundations and infrastructure, environmental baseline studies and socio-economic studies were expanded.

The Casino deposit has reserves of 558 million t of 0.25 percent copper, 0.3 g/t gold and 0.025 percent molybdenum contained in the leached cap, supergene and hypogene zones. Included in this figure is a high-grade, open pit mineable core of 90 million t grading 0.48 percent copper, 0.05 percent molybdenum and 0.48 g/t gold.

Loki Gold Corporation purchased its joint venture partner's, **Hemlo Gold Mining Corp.**, share of the BREWERY CREEK (10) gold property in June 1993. Loki immediately began engineering studies towards mine feasibility, including 7 956 m of percussion drilling, environmental baseline studies, geotechnical work and a socio-economic impact study. Loki wants to be in production by late summer 1995.

The Brewery Creek deposit has reserves of 15.4 million t (in nine zones) with an average grade of 1.88 g/t gold. Of this amount approximately 10 million t is oxide, heap leachable mineralization. Following the 1993 exploration program, reserve estimates of contained gold were increased by 35 percent to 23 265 kg of gold, of which 18 662 kg is recoverable.

Kennecott Canada Inc. drilled 3 100 m on its LONESTAR (4) gold property, a former producer near Dawson. Kennecott also trenched, mapped and carried out geophysical surveys on several properties in the area.

Ivanhoe Goldfields Ltd. evaluated the DUBLIN GULCH (12) gold property near Mayo with 2 079 m of percussion drilling (on the Eagle zone), 250 m of trenching, 2.5 km of Genie EM surveying, contour soil geochemical surveying, geological mapping and baseline environmental work.

Yukon Revenue carried out geological mapping, geochemical surveys and 2 169 m of percussion drilling on its Aurex or NEWRY (13) gold property near Mayo.

Mineral Dispositions

Quartz claims in good standing at the end of December 1993 totalled 40 448 compared with 43 231 the previous year. A total of 4 963 new quartz claims were staked in 1993 compared with 4 488 the previous year. A total of 7 378 quartz claims lapsed in 1993 compared with 4 882 in 1992.

**Table 2: Mineral Dispositions Staked and Lapsed, Yukon,
1992 and 1993**

	1992 Calendar Year Staked (Lapsed)	1993 Calendar Year Staked (Lapsed)
Quartz Claims	4 488 (4 882)	4 963 (7 378)
Placer Claims	867 (1 534)	1 047 (1 149)
Placer Leases to Prospect	186 (133)	200 (175)

**Table 3: Mineral Dispositions in Good Standing, Yukon,
1992 and 1993**

	1992 December 31	1993 December 31
Quartz Claims	43 231	40 448
Placer Claims	17 115	17 338
Placer Leases to Prospect	239	303
Iron and Mica Claims	525	525
Coal Leases and Licences	36	41
Dredging Leases	7	6
Total	61 153	58 661

Source, both tables: Department of Indian Affairs and Northern Development, Yukon Region.

Geoscience Support

The activities and recent publications of the Exploration and Geological Services Division, Northern Affairs Program, DIAND, in Yukon Region are described in *Yukon Exploration and Geology 1993*. This publication may be obtained by writing to G. Abbott, Chief Geologist, Exploration and Geological Services Division, Northern Affairs Program, DIAND, 200 Range Road, Whitehorse, Yukon, Y1A 3V1.

The Canada-Yukon Economic Development Agreement was signed in May 1991. Under the agreement, the Canada-Yukon Co-operation Agreement on Mineral Development provides for expenditures up to \$9 million from 1991 to 1996. The co-operation agreement allocates the funds as follows: i) Geoscience Program, \$6.3 million; Mineral Technology Program, \$1.8 million; and Public Information on Mining, \$0.9 million. The Energy and Mines Branch, Department of Economic Development, Tourism and Small Business, Government of Yukon, is the prime administrative agency for the co-operation agreement. During 1993, seven geological mapping, two geochemical and one geophysical programs were conducted in Yukon under the Geoscience Program. Two projects were completed under the Mineral Technology Program.

Mineral Exploration

Mineral exploration expenditures increased to \$19.5 million in 1993 from \$10 million in 1992 (\$16 million in 1991). The majority of the 1993 expenditures supported several advanced mineral development projects. Two of the largest involved delineation of porphyry copper deposits in the Dawson Range (CASINO and WILLIAMS CREEK) northwest of Carmacks. Four additional projects of similar size and significance (over 2 000 m of drilling during the year), two near Dawson (BREWERY CREEK and LONESTAR) and two others near Mayo (NEWRY and DUBLIN GULCH) (Table 4) involved bulk-tonnage, low-grade gold deposits.


Exploration Projects

Gold

Four of the most significant, large, low-grade gold properties, BREWERY CREEK (10), LONESTAR (4), DUBLIN GULCH (12) and NEWRY (13) are documented in the "Advanced Exploration and Development" section.





MAP 1 MINERAL EXPLORATION AND MINES, YUKON 1993


LEGEND

-  Producing Hardrock Mine
 - a Curragh Inc.
Faro and Vangorda Mines, Zn, Pb
 - b Teck Corp. and Cominco Ltd.
Sä Dena Hes Mine, Zn, Pb
 - c Max Rosequist, King Arctic, Jade

(1) to (8) Areas of Placer Mine Operations

(20) Areas of Mineral Exploration Activity
Refer to Yukon Table and Text

-  LEAD, ZINC
-  COPPER, NICKEL (GOLD)
-  GOLD, SILVER
-  OTHER

 ROAD

SCALE

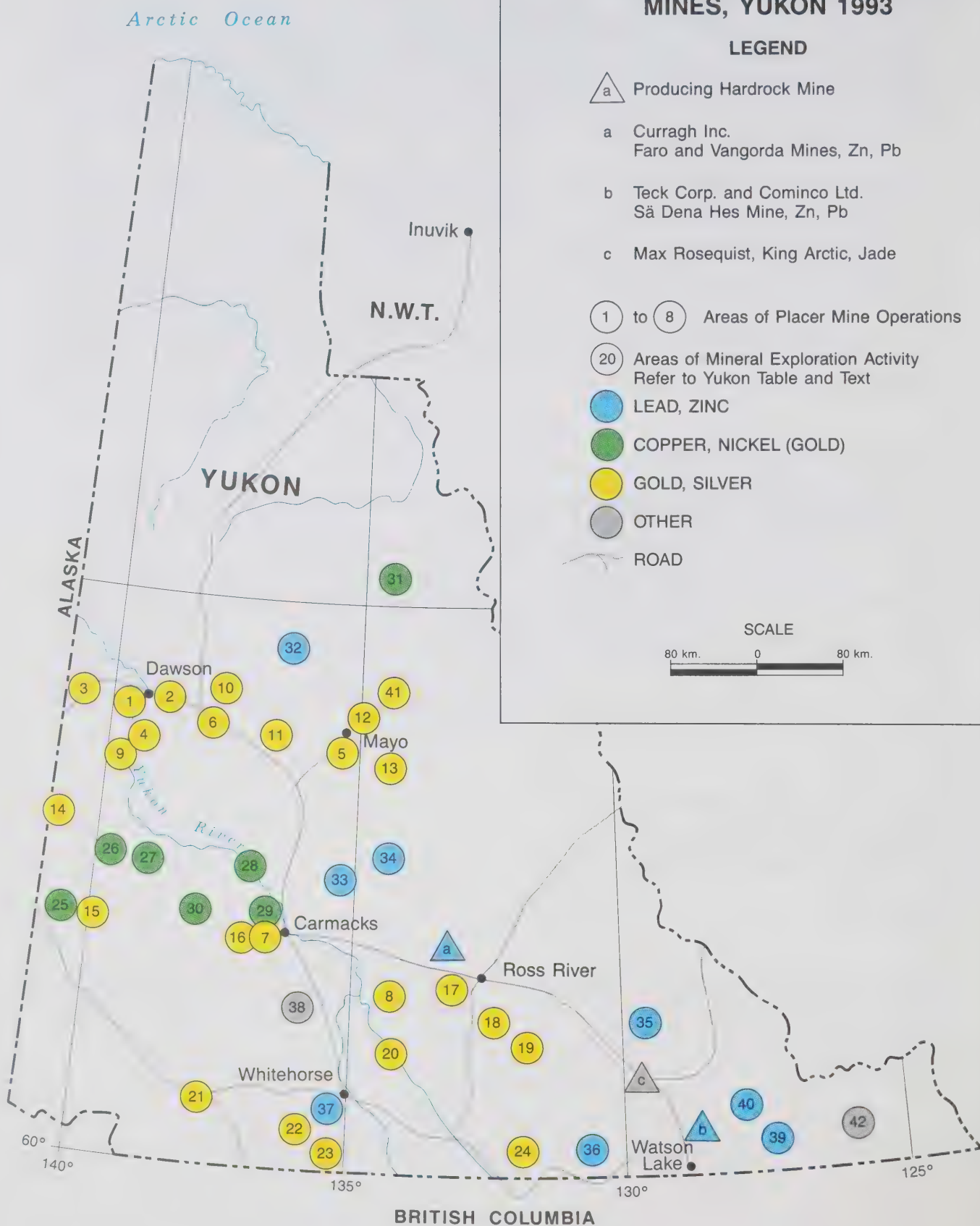


Table 4: Exploration Drilling, Yukon, 1993

Project	Company	Diamond Drilling		Percussion Drilling	
		Metres (m)	No. of Holes	Metres (m)	No. of Holes
CASINO	Pacific Sentinel	50 316	127		
BREWERY CREEK	Loki Gold			7 956	151
WILLIAMS CREEK	Western Copper, Thermal Exploration	3 781	11	2 805	11
LONESTAR	Kennecott	1 212	20	3 100	41
NEWRY	Yukon Revenue			2 169	128
DUBLIN GULCH	Ivanhoe Goldfields			2 079	10
GREW CREEK	YGC Resources	1 944	17		
DAN	Cominco	1 581	8		
WHYTE	Mountain Province	1 533	23		
CLEAR LAKE	Mitsui Kinzoku	1 456	6		
HART RIVER	Inco	1 200	6		
DIVISION	Cash Resources	1 141	11		
MINTO	Minto Exploration	984	8		
ANA	Eastfield Resources	804	6		
ROOTS (Big Thing)	Amcorp Industries, Feather Gold	762	10		
LOGTUNG	NDU Resources	500	2		
MOOSEHORN	Hartley/Almberg	339	36		
AZ	Noranda	232	4		
LOON	Cash Resources	116	2		

Source: Department of Indian Affairs and Northern Development, Yukon Region.

Pacific Mariner Explorations Ltd. with an associated company, **Wealth Resources Ltd.**, conducted geophysical and soil geochemical surveys and trenching on their CLARA (4) claims in the Klondike. Several gold soil anomalies were located.

Richlode Investments Corp. explored its optioned KEY (4) claims on McKinnon Creek, where seven bulk and nine grab samples from surface and trenches indicated low gold values. Previous work, carried out from 1974 to 1987, indicated that gold values increase with depth.

Arbor Resources Inc. continued to explore its substantial holdings in the Klondike District (9). Reconnaissance work was carried out on recently staked ground in the Black Hills, south of Dawson.

Ivanhoe Goldfields Ltd. carried out geological mapping and a geochemical survey on its JOSEPHINE (11) property west of Mayo.

North of Mayo, **Ivanhoe Goldfields Ltd.** continued an extensive drilling program, begun by **Amax Gold Inc.** in 1991, on various properties in the Dublin Gulch (12) and Haggart Creek areas. Ivanhoe completed 10 reverse circulation holes totalling 2 079 m on the Eagle zone. In addition, geological mapping, baseline environmental work, 250 m of excavation trenching, 2.5 km of Genie EM and contour soil geochemical surveys were carried out.

United Keno Hill Mines Ltd. contracted an examination of the technical and economic feasibility of resuming production at its Elsa (41) area mining camp. A preliminary review indicated that additional silver-lead reserves are likely to be found. A surface and underground drilling program is planned for mid 1994. The company installed a 7.6 m thick concrete barrier in the Galkeno Mine to reduce the flow of zinc-bearing water from the mouth of the mine adit.

G. Hartley and G. Almberg drilled 339 m of percussion drilling in 36 holes on their MOOSEHORN (14) gold property in the Moosehorn Range, southwest of Dawson.

Mendocino Resources Ltd. trenched the ARN and TAYLOR (15) claims, 300 km northwest of Whitehorse.

Aurchem Exploration Ltd. expanded the geophysical surveys completed last year on its GOULTER (16) option on Discovery Creek, 50 km west of Carmacks. Gold and silver-bearing veins occur along two major north-trending structures, named the Willow Creek and Eliza Creek zones.

On Mount Freegold, **Rendell Mining Ltd.** conducted a geochemical survey on its optioned LAFORMA (16) property. Rendell commissioned a consultant to evaluate the Laforma mine, which has geological reserves of 450 000 t of 11.3 g/t gold, as a large-tonnage open pit operation. Rendell also optioned the GOLDSTAR property immediately to the west of the Laforma mine. The Margarete showing, one of five on the property, has drill indicated reserves of 116 000 t of 4.1 g/t gold and 48 g/t silver accessible by open pit mining methods.

B.Y.G. Natural Resources Inc. optioned its MOUNT NANSEN (16) gold-silver property to **Gestion S.R.C. Inc.** which examined the property and mill and carried out new metallurgical work on the open pit and underground mineralization. Gestion returned the property to B.Y.G. citing metallurgical problems.

In the same area, **Richlode Investments Corp.** carried out a soil geochemical survey and trenching program on its ANT (16) property, near the Laforma mine. Three gold anomalies were located.

YGC Resources Ltd. conducted geophysical and geochemical surveys on its GREW CREEK (17) property and 17 holes totalling 1 944 m were drilled.

Pacific Comox Resources Ltd. mapped and geochemically surveyed its TAY-LP (18) property.

Mountain Province Resources Ltd. drilled 1 533 m in 23 holes on the West Zone on its WHYTE (19) property in the Ketza River area, southeast of Ross River. Gold was encountered but was not of sufficient grade to provide reserves for the adjacent Ketza River gold mill.

YGC Resources Ltd. purchased the former Ketza River (19) property from **Wheaton River Minerals Ltd.** which received 48 percent of YGC's shares. **Hemlo Gold Mines Inc.** has an option on the mineral claims and leases, excluding the known mineral deposits and mill. Hemlo compiled existing data on the KETZA (19) property.

Cash Resources Ltd. drilled two holes totalling 116 m on its LOON (20) property.

Graham Davidson geophysically surveyed his DECOELI (21) property near Haines Junction.

On Mt. Anderson, in the Wheaton River area, south of Whitehorse, **Adda Minerals Ltd.** conducted further exploration for gold-bearing veins and skarn mineralization on the ROB claims (22).

Feather Gold Resources Ltd. and **Amcorp Industries** drilled 762 m on their ROOTS, BIG THING (23) property on Montana Mountain, south of Carcross. The 10 drill holes located moderate- to low-grade gold and base metal mineralization over a strike length of 160 m.

Cash Resources Ltd. drilled its DAWSON (23) copper-gold property, near Carcross.

NDU Resources Ltd. mapped, conducted geochemical surveys and drilled 500 m in two holes on its LOGTUNG (24) property in its search for gold mineralization. The property hosts a large low-grade tungsten-molybdenum deposit of over 250 million t.

Copper-Nickel (Gold)

Two of the largest copper-gold drilling programs were on the CASINO (27) and WILLIAMS CREEK (29) properties. These are documented in the "Advanced Exploration and Development" section.

Expatriate Resources Ltd. explored the Canalask nickel-copper (454 545 t grading 1.5 percent nickel) deposit (25) with trenching, geological and geochemical mapping. In the same area, **Noranda Exploration Co. Ltd.** drilled 232 m in four holes on the AZ property (25), a poorly exposed copper-gold-bearing skarn on Hump Mountain.

Eastfield Resources Ltd., in joint ventures with **Breckenridge Resources Ltd.**, **Achievers Training Group**, **Rockwealth International Resource Group** and **Canadian Comstock Explorations Ltd.**, worked on five properties (KOFFEE, MAYA, NICE, ANA and AZTEC) (26) adjacent to the western boundary of the Casino property. Eastfield and partners mapped, carried out induced polarization (IP), magnetometer and geochemical surveys on all of the claims. Eastfield and Breckenridge also drilled 804 m in six holes on the ANA claims (26) where anomalous copper-gold values are associated with quartz-sericite alteration. Eastfield reported that the mineralizing system found on the Casino property extends at least 5 to 6 km west of the Casino boundary.

Minto Explorations Ltd., a company formed in April 1993 to acquire the MINTO and DEF (28) properties northwest of Carmacks, carried out an airborne radiometric survey and drilled eight holes (984 m) for infill and metallurgical studies. Minerale reserves of 5.5 million t grading 2.21 percent copper, 10 g/t silver and 0.65 g/t gold have been delineated. A feasibility study is underway with a target completion date of July 1, 1994. The company anticipates that a positive study would result in the building of a 1 360 t per day mill, possibly in late 1995.

Pintail Resources Ltd. geologically mapped and carried out proton magnetometer and VLF surveys as well as bulldozer trenching on the GRANITE MOUNTAIN (29) copper property to evaluate the gold potential. A copper anomaly 1 500 m long by 60 to 240 m wide is associated with a mineralized breccia zone in a possible Cretaceous porphyry stock.

Patriate Resources Ltd. carried out geophysical surveys on its CASH and NITRO property (30).

Pamicon Developments Ltd., **Equity Engineering Ltd.** and **Westmin Resources Ltd.** explored the Wernecke and Ogilvie Mountains to locate copper-uranium-cobalt-silver-gold breccia bodies such as those found on the IGOR claims (31). The companies carried out extensive staking, prospecting, mapping and rock geochemistry. IP and magnetometer surveys were completed on some properties.

International Prism Explorations Ltd. and **Western Keltic Mines Ltd.**, among others, explored in the Wernecke and Ogilvie Mountains (31). Western Keltic conducted geological mapping and geochemical surveys on its NEW (31) copper-uranium claims.

Zinc-Lead

Inco Ltd. carried out an extensive HLEM survey on its optioned HART RIVER (32) copper-lead-gold property, northeast of Dawson.

Mitsui Kinzoku Resources of Canada Inc. continued exploring the CLEAR LAKE (33) shale-hosted zinc-lead deposit, 80 km northwest of Faro. Drilling in 1978 outlined approximately 30 million t of massive sulphides, including 5.33 million t grading 11.34 percent zinc, 1.99 percent lead and 40.8 g/t of silver. The 1993 exploration consisted of 1 456 m of diamond drilling to test coincident gravity and magnetic anomalies peripheral to known mineralization.

Dromedary Exploration Company Ltd. conducted geophysical and geochemical surveys on its DROMEDARY (34) zinc-lead property, northwest of Faro.

Cominco Ltd. mapped and explored its FIN property (35) with geophysical surveys, where sphalerite and galena mineralization up to 70 cm in thickness occur in the Devono-Mississippian Earn Group.

Cominco Ltd. explored its DAN property (36) in the Swift River area with geological mapping, geophysical and geochemical surveys and 1 581 m of drilling. Several showings of massive sphalerite are hosted in Late Paleozoic calc-silicate rocks and felsic tuffs.

Silver Sabre Resources Ltd. conducted a trenching and geophysical survey program on its TENNEY (37) property, southwest of Whitehorse, directed at lead-zinc-silver mineralization.

International Barytex Resources Ltd. staked additional claims at its MEL (39) zinc-lead-barite deposit to cover the extension of the Jeri zone which was excavator trenched. Two of the 11 trenches returned zinc values of 10.5 percent and 16.5 percent over 5 m widths.

International Barytex Resources Ltd. carried out line cutting on its BARB (40) property, on the east shore of Francis Lake, northeast of Watson Lake. The Matt Berry deposit on the property contains over 530 000 t of lead-zinc-silver mineralization.

Coal

Cash Resources Ltd. carried out a program of detailed mapping, hand trenching and 16 drill holes totalling 1 826 m on its Division (38) coal property, 90 km north of Whitehorse. Over 30 coal seams occur within a 400 m sandstone and shale interval in the Jurassic Laberge Group. The Cairnes seam has a ranking of High Volatile Bituminous B and a calorific value of about 7 500 kcal/kg (13 500 Btu/lb). Sulphur content is 0.3 percent and trace elements are very low (0.6 ppm selenium, 0.5 ppm antimony, 3.0 ppm arsenic). Drill-indicated (surface and underground) mineable reserves total 11.2 million t.

Diamonds

Teryl Resources Corp. carried out a surface exploration program on its KOR (42) property, northwest of Watson Lake. Kimberlite was reported to occur on the property.

Northwest Territories

Mineral Production

Five gold mines and two zinc-lead mines operated in the Northwest Territories during 1993 (Map 2). Production statistics for the mines are given in Table 5.

The value of mineral production in the Northwest Territories was estimated at \$402.9 million in 1993 compared with \$481.9 million in 1992. Mineral production and depressed gold, zinc and lead prices continued in the same manner as the previous year. Zinc and lead production accounted for 14.6 and 15.4 percent respectively of the mineral production value and gold accounted for 39 percent.

Exploration expenditures were reported to be \$75 million in 1993, compared to an estimated \$38 million in 1992. Most of the attention during the year continued to focus on the claim staking rush and diamond exploration play in the Lac de Gras area, in central Slave Geological Province, northeast of Yellowknife. Staking in the Northwest Territories during 1993 covered 11.8 million ha, mainly occurring in the central Slave Province. In addition, 151 Prospecting Permits covering 2.9 million ha were issued compared to 22 covering 408 115 ha in 1992.

BHP Minerals Canada Ltd./Dia Met Minerals Ltd. and Kennecott Canada Inc. and partners proceeded to bulk sample at least four pipes near year's end. Test samples of 3 000 to 5 000 t are being taken for processing. Two pipes are being accessed by underground workings and at least two are being sampled using large diameter drills over the winter of 1993-94.

Metall Mining Corp.'s commitment to proceed toward the development of the IZOK (Izok Lake) base metal property, 265 km south of Coronation Gulf, intensified exploration in 1993 of other important undeveloped polymetallic sulphide deposits in the northern part of Slave Structural Province. The proposed Izok mine development is coupled with the building of a winter road between the IZOK property and Coronation Gulf, and a bulk marine shipping port on Coronation Gulf with the capacity to transporting some 400 000 t of concentrate annually. Unfortunately, the bankruptcy of Metall's parent company, Metallgesellschaft AG, severely impacted upon the financial stability of Metall. This caused Metall to postpone its development plans for Izok Lake.

The seven operating mines in the Northwest Territories employed 1 606 people in 1993 compared with 1 525 people in December 1992.

The mineral industry in the Northwest Territories accounted for 14.6 percent of the zinc, 15.4 percent of the lead and 8.5 percent of the gold produced in Canada during 1993. The 1993 metallic mineral production value, \$389.1 million, amounted to 4.42 percent of Canada's 1993 metallic mineral production. This compares with 4.59 percent in 1992.

Mines

Cominco Ltd., Polaris Mine

The Polaris zinc-lead mine (a) ** concentrator and related exploration properties are 77.5 percent owned by Cominco and 22.5 percent by Pine Point Mines Limited. Cominco is the operator of the joint venture. The Polaris mine, located on Little Cornwallis Island, processed 1 026 800 t of ore to produce 195 097 t of zinc concentrate and 40 903 t of lead concentrate. This compares with 1 066 700 t of ore in 1992 that yielded 217 935 t of zinc concentrate and 51 742 t of lead concentrate. Surface exploration drilling south of the orebody totalled 3 175 m. Exploration efforts were reduced in 1993 due to financial considerations brought on by poor world lead and zinc prices. Lower concentrate production was due to a combination of lower grade ore being mined and difficult ground conditions which reduced the amount of ore mined.

Type:	underground
Location:	Little Cornwallis Island (120 km northwest of Resolute)
Product:	zinc, lead
Mill Capacity:	3 100 tpd
Tonnes Milled:	1 026 800 t
Reserves:	8.6 million t (December 31, 1993)
Reserve Grade:	13.4 percent zinc, 3.7 percent lead
Employees:	236 (December 1993)

Conwest Exploration Company Limited, Nanisivik Mine

The Nanisivik mine is operated by Nanisivik Mines Ltd., a wholly-owned operating division of Conwest Exploration Company Limited. Mill concentrate production at the Nanisivik mine (b) was increased marginally from the previous year because modifications to the tailings pumping system allowed a 10 percent increase in the tonnage milled while allowing a lower average grade of mill feed to be mined, as a planned response to weak zinc markets. The mill processed a record high 724 000 t of ore at an average grade of 7.7 percent zinc, 0.3 percent lead and 32 g of silver per t to yield 95 800 t of zinc concentrate and 700 t of lead concentrate. The concentrate contained 53 200 t of zinc, 300 t of lead and 16 800 kg of silver. Concentrate shipments during the year amounted to 54 200 tonnes. Nanisivik withheld approximately 40 percent of the zinc concentrate shipments it normally would have made in 1993 due to low world prices and high treatment charges.

The mill modifications allow lower grade mineralization to be processed, particularly from satellite deposits near the main orebody where the majority of ore is currently being mined. Operating costs were reduced to \$38 per t of ore treated versus \$41 per t in 1992. The lower Canadian dollar also helped offset the decline in world lead and zinc prices.

** Numbers or letters in parenthesis indicate the location of the property on Maps 2 and 3.

Underground exploration successfully delineated additional reserves, so that total proven and probable reserves increased by 2 000 t despite mining a record 724 000 t during the year. The grade of reserves remained almost identical with that of a year ago, with the lead grade declining by 0.1 percent and the silver grade increasing by 1 g per t. An estimated 10 500 m of underground definition drilling was completed during the year.

Type:	underground
Location:	27 km east of Arctic Bay, Baffin Island
Product:	zinc, lead, silver
Mill Capacity:	2 200 tpd
Tonnes Milled:	724 000 t
Reserves:	2 321 000 t (December 31, 1993)
Reserve Grade:	8.5 percent zinc, 0.2 percent lead, 40 g/t silver
Employees:	184 (December 1993)

Echo Bay Mines Ltd., Lupin Mine

The Lupin gold mine (c) is located 90 km south of the Arctic Circle and approximately 400 km northeast of Yellowknife. The mine was closed for four weeks in the summer of 1993 to reduce costs.

Lupin produced its 2 millionth ounce (62 206 kg) of gold on April 28, 1993 and still has nearly 1 million ounces (31 103 kg) of gold in reserves.

The mine produced 6 764.9 kg of gold compared with 6 671.6 kg in 1992. The amount of ore milled was 2 085 tpd compared with 1 855 tpd in 1992, due to a 15 percent expansion of the mill that began in 1992 and was completed in April 1993. During the year, changes in stope design for the levels below the 730-m level reduced the stope height from 70 m to 20 or 40 m. Increased use was made of remote controlled scoops to recover ore from stopes. Production in 1993 was from the 570 to 730- and 1090 to 1130-m levels in the Centre zone and the 410 to 490- and 570 to 650-m levels in the West zone. Underground drilling totalled 9 800 m in 1993. Lupin's proven and probable reserves have been delineated to a depth of 1 170 m. Reserves at year end were slightly higher, but of a lower grade than a year earlier. Exploration is continuing on the property for gold mineralization and diamond-bearing kimberlites.

Type:	underground
Location:	400 km northeast of Yellowknife
Product:	gold
Mill Capacity:	2 085 tpd
Tonnes Milled:	773 446 t
Reserves:	2.67 million t (December 31, 1993)
Reserve Grade:	8.6 g of gold per t
Employees:	466 (December 1993)

**Table 5: Mineral Production of Operating Mines,
Northwest Territories, 1991, 1992 and 1993**

Company, Mine and Commodity	1991		1992		1993(P)	
	t	kg	t	kg	t	kg
Cominco Ltd.						
Polaris Mine						
zinc	142 471		134 684		121 545	
lead	37 738		40 773		32 232	
Echo Bay Mines Ltd.						
Lupin Mine						
gold		6 746		6 671		6 765
Royal Oak Mines Ltd.						
Giant Mine						
gold		3 183		2 982		2 891
Colomac Mine						
gold		2 423		NIL		NIL
Conwest Exploration Company Ltd.						
Nanisivik Mine						
zinc						
lead	54 800		52 100		53 200	
silver	400		300		300	
		18 500		16 000		16 800
Miramar Mining Corp.						
Con Mine						
gold		3 825		3 732		3 760
Ger-Mac Contracting Ltd.						
Mon Mine						
gold		NIL		6.2		39.3
Treminco Resources Ltd.						
Ptarmigan Mine						
gold		462*		476*		215*

Source: Department of Indian Affairs and Northern Development. These figures are reported by the mines as production and will not match Statistics Canada's production figures that are based on metals sold or shipped.

(P) = Preliminary N/A = Not Available NIL = No Production

* Fiscal year August 1 to July 31 (i.e. August 1, 1992 to July 31, 1993 for fiscal year 1993)

Ger-Mac Contracting Ltd., Mon Mine

Ger-Mac Contracting Ltd. operated the Mon mine (g) on a seasonal basis for four months in 1993. Gold production, from a quartz vein in volcanics, was estimated to be 39.3 kg of gold compared to 6.2 kg in 1992. The ore is crushed at the minesite and sorted on a shaker table to form a concentrate which is refined in Yellowknife. The tonnage milled in 1993 increased to 3 300 t from 1 500 t in 1992.

Type:	underground
Location:	48 km north of Yellowknife
Product:	gold
Mill Capacity:	100 tpd
Tonnes Milled:	3 300 t
Reserves:	N/A
Reserve Grade:	N/A
Employees:	9

N/A Not Available

Miramar Mining Corp., Con Mine

NERCO Con Mine Ltd., a unit of NERCO Minerals Company, was sold to Miramar Mining Corporation on October 14, 1993 for \$25 million and 1.5 million shares of Miramar. Production at the Con mine (d) was from the 2300-foot to the 5900-foot levels. The mine produced 3 760.1 kg of gold from 366 278 t of ore in 1993 compared to 3 547 kg of gold and 933 kg of silver in 1992.

The Con mine produced its 5 millionth ounce (155.515 t) of gold in December 1993, and still has over 35 t of gold contained in reserves.

Approximately 38 100 m of underground ore-definition drilling was completed. Exploration in the mine area located reserves containing 1 928 kg of gold.

Miramar plans to increase mill capacity in 1994 by more than 25 percent by splitting the mill circuit to separately treat free milling (native gold) and refractory (gold in sulphides) ores and converting the gold recovery system to a carbon-in-leach system.

Type:	underground
Location:	1.4 km south of Yellowknife
Product:	gold, silver
Mill Capacity:	1 180 tpd
Tonnes Milled:	366 278 t
Reserves:	3.36 million t (January 1, 1994)
Reserve Grade:	10.62 g of gold per t
Employees:	337 (December 1993)

Royal Oak Mines Inc., Giant Mine

In July 1991, Royal Oak Mines Inc. was formed by the amalgamation of Royal Oak Resources Ltd., Pamour Inc., Pamorex Minerals Inc., Akaitcho Yellowknife Gold Mines and Giant Yellowknife Mines Limited. All ore production at the Giant mine (e) in 1993 was from underground.

A bitter strike, that began on May 23, 1992, ended on November 11 1993, after the Canada Labour Relations Board ordered the two sides to resume negotiations based on a tentative agreement that the union had rejected in April 1992. The majority of striking workers voted to accept the contract offer and 135 union employees were recalled.

Royal Oak transferred a number of replacement workers to the recently acquired Colomac Mine that is to be re-opened in 1994.

The Giant mill processed 375 010 t of ore to yield 2 891 kg of gold. This compares with the 358 354 t of ore processed in 1992 that yielded 3 982 kg of gold.

Type:	underground
Location:	2.4 km north of Yellowknife
Product:	gold, silver
Mill Capacity:	1 000 tpd
Tonnes Milled:	375 010 t
Reserves:	2.36 million t (December 31, 1993)
Reserve Grade:	10.97 g/t gold
Employees:	354 (December 1993)

Treminco Resources Ltd., Ptarmigan Mine and Tom Mine

At the Ptarmigan and Tom mines (f), gold production for the company's 1993 fiscal year (August 1, 1992 to July 31, 1993) amounted to 215 kg of gold compared to 430 kg of gold in the previous fiscal year. Production was from four levels in the Ptarmigan mine, two levels on the C vein and one level on the Tom vein in the Tom mine. Tonnes milled in the 1993 fiscal year dropped to 25 000 t from 42 365 t in the previous fiscal year.

The operation is sensitive to world gold prices. Without better gold prices and successful exploration to increase reserves, the mining operation will have difficulty sustaining itself beyond mid-1994.

Type:	underground
Location:	20 km east of Yellowknife
Product:	gold
Mill Capacity:	180 tpd
Tonnes Milled:	25 000 t
Reserves:	55 000 t (July 31, 1993)
Reserve Grade:	8.57 g of gold per t
Employees:	20 (December 1993)

Advanced Exploration and Development

Royal Oak Mines Inc. purchased the closed Colomac gold mine (11) from Neptune Resources Corp. in April 1993. Following a feasibility study, Royal Oak announced that the Colomac mine would be reopened in March or April 1994.

Royal Oak recruited eight laid-off Curragh Inc. employees from Faro, Yukon in mid-December to join some employees who were transferred to the Colomac operation from Royal Oak's Giant mine. Many of these workers had replaced striking workers at the Giant mine. The first gold bar is expected to be poured in May.

Two base metal projects, Izok Lake (36) in the northern Slave Province and Prairie Creek (31) in the southern Cordillera were in the advanced exploration stage. Both may reach production later in this decade.

Metall Mining Corporation conducted the largest and most expensive (\$10 million), non-diamond exploration program on its Izok Lake (36) base metal deposit as well as exploring the Gondor and other base metal showings in the northern Slave Structural Province. Feasibility, environmental and transportation studies on the Izok Lake deposit were underway in 1993. Metall expects to receive all of the government approvals necessary to begin construction of its Izok Lake mine in 1995 and shipping its first concentrate in 1998, contingent on a positive feasibility study. The company is negotiating its own and Nunavut's first Inuit Impact Benefits Agreement. Unfortunately, Metall's parent company faced bankruptcy in late 1993 and was considering the sale of Metall. The Izok Lake project was placed in suspension. Metall indicated that it will help fund hydrographic surveys of proposed shipping routes to the Coronation Gulf over the next four years.

San Andreas Resources Corporation greatly enlarged the tonnage and reserves of its Prairie Creek (31) base metal deposit during the year. Exploration extended the Zone 3 stratiform deposit which now has minimum dimensions of 320 m long by 70 m wide with an average thickness of 9.5 m. A second flat-lying stratiform mineralized zone (Zone 6) and widespread Mississippi Valley Type mineralization on surface (Zebra showing), which may have open pit potential, were discovered. The deposit has much of the infrastructure required for production already in place. Company officials have stated that they are committed to bringing the property into production by early 1996.

Diamond explorers indicated that at least four diamond-bearing kimberlite pipes would be bulk sampled during the winter of 1993-1994. **BHP Minerals Canada Ltd.** and **Dia Met Minerals Ltd.** started to drive a decline adit into Pipe 4 (Koala) and will bulk sample Pipe 3 (Fox) (79) by large-diameter reverse circulation drilling. The test samples of 3 500 to 5 000 t will be processed at a heavy-media separation plant that has been assembled on the property as part of a 112-person camp. Dia Met will conduct a large diameter drilling program on a number of promising targets discovered in 1993. Contractors for **Kennecott Canada Inc.** began to drive a decline adit at the beginning of October to conduct an underground bulk sampling program on the Tli Kwi Cho pipe (92) on the DHK property. The 5 000 t sample will be processed at a plant constructed on the Con mine property in Yellowknife.

Athabaska Gold Resources Ltd. decided to mine a 3 500 t bulk sample for metallurgical testing at its Nicholas Lake gold (126) property. If the results are favourable, the company will begin the design of a mine which will employ between 70 and 100 workers. The company hopes to be in production by October 1995 contingent on the results of the metallurgical and feasibility studies.

**Table 6: Mineral Claims, Leases, Prospecting Permits
Northwest Territories, 1992 and 1993**

	1992 Calendar Year	1993 Calendar Year
Number of Claims and Leases in Good Standing	10 974	24 283
Hectares	9 227 521	20 638 685
Number of Leased Claims	11 055	10 101
Hectares (Surveyed)	263 725	237 692
Claims Recorded	7 913	13 903
Hectares	7 178 096	11 812 749
Prospecting Permits Issued	22	148
Hectares	408 115	2 905 722
Prospecting Permits Cancelled, Expired or Relinquished	43	18
Prospecting Permits in Good Standing	70	200
Hectares	1 322 935	3 902 312

Source: Department of Indian Affairs and Northern Development, Northwest Territories Region.

Mineral Dispositions

Staking, primarily for diamonds, expanded outward from the central Slave Province. The number of claims staked in 1991 increased dramatically in November and December after the discovery of a diamondiferous kimberlite pipe in the Lac de Gras area was announced. The staking rush continued unabated in 1992 and 1993.

Table 7: Diamond Drilling, Northwest Territories, 1992 and 1993

	1992 Calendar Year	1993 Calendar Year
	Meters (m)	
Surface Drilling	96 098	176 000
Underground Drilling	75 540	84 000
Total Drilling	169 638	260 000

Source: Department of Indian Affairs and Northern Development, Northwest Territories Region.

By 1993 year end, 13 903 claims, covering 11.81 million ha were recorded in the Northwest Territories, compared with 7 913 claims covering 7.18 million ha in 1992 (Table 6) and 831 claims covering 666 374 ha in 1991. At 1993 year end, 24 283 claims, covering 20.64 million ha in the Northwest Territories, were in good standing, compared with 10 974 claims covering 9.22 million ha in 1992 (Table 6) and 3 859 claims covering 2.52 million ha in 1991 .

On February 1, 1993, 18 Prospecting Permits, granting exclusive mineral exploration rights to one quarter of a mining claim map, expired or were relinquished and 200 new permits were granted. **Taiga Consultants Ltd.** obtained 33 permits, **Melinga Resources Ltd.** obtained 20 permits, **Leeward Capital Corp.** four permits and **M.P. Mudry** three permits, all in the District of Keewatin where the target is diamonds. **Cominco Ltd.** obtained 14 permits and **Aber Resources Ltd.** obtained 13 permits, all on Victoria Island, where the target is copper. **Noranda Minerals Inc.** obtained four permits in the Fox Fold Belt on Baffin Island and six permits north of Takijuq Lake, on the boundary between Bear Province and Slave Province. Targets in both areas are copper-zinc. **Cameco Corp.** obtained 11 permits northwest of Baker Lake in the search for uranium. **Stewart Blusson** obtained eight permits on the Bear-Slave Province boundary in the search for diamonds.



Geoscience Support

The activities and recent publications of Geology Division, Northern Affairs Program, DIAND, in Northwest Territories Region are described in *Exploration Overview 1993*. It may be obtained from: Dr. W. A. Padgham, Chief Geologist, Geology Division, Northern Affairs Program, DIAND, P.O. Box 1500, Yellowknife, NWT, X1A 2R3.



MAP 2 MINERAL EXPLORATION AND MINES NORTHWEST TERRITORIES, 1993

LEGEND






-  Producing Mine
- a Cominco Ltd., (Polaris Mine), Pb, Zn
- b Conwest Exploration Co. Ltd., (Nanisivik Mine), Pb, Zn, Ag
- c Echo Bay Mines Ltd., (Lupin Mine), Au, Ag
- d Miramar Mining Corp., (Con Mine), Au, Ag
- e Royal Oak Mines Inc., (Giant Mine), Au, Ag
- f Treminco Resources Ltd., (Ptarmigan Mine), Au, Ag
- g Ger-Mac Contracting, (Mon Mine), Au, Ag
-  Areas of Mineral Exploration Activity
Refer to N.W.T. Table and Text

SCALE

200 km. 100 0 100 200 km.



Road

-  Areas of Exploration Activity
Refer to N.W.T. Table and Text
-  URANIUM, RARE EARTH ELEMENTS
-  GOLD, SILVER
-  ZINC, LEAD, COPPER
-  DIAMONDS

The Canada-Northwest Territories Economic Development Framework Agreement was signed in February 1991. Under the agreement, DIAND and the GNWT will co-operate in the delivery of a number of economic development initiatives.

Four of the initiatives fall under the title of Mineral Initiatives. These initiatives have a budget of \$8.2 million over the term of the agreement, 1991-1996, and are divided as follows:

I Geoscience Initiative	\$7.5 million
II Technology Initiative	\$200 000
III Information Initiative	\$200 000
IV Prospector's Initiative	\$300 000

The Northwest Territories Department of Energy, Mines and Petroleum Resources is the implementing party for the initiatives. It has established a Mineral Initiatives Office to co-ordinate the delivery of the initiatives.

In 1993, 17 geoscience-field projects operated under the Geoscience Initiative. A number of projects are supported by the Technology Initiative. A series of lessons and activities on geology, mining and the mineral industry are being developed for NWT schools under the Information Initiative. The Prospector's Initiative supported 16 prospectors across the NWT.

The Geoscience Initiative partially funded 15 of the 54 Geological Survey of Canada field projects. DIAND contributed to five GSC projects and NWT Geology Division partially funded eight university-contract projects and carried out two mapping projects plus two other projects. The Mineral Initiatives Office in Yellowknife managed five mapping programs and continued support of the Computerized Mineral Showings Database.

Mineral Exploration

Mineral exploration expenditures in the Northwest Territories in 1993 were reported to be \$75 million compared with an estimated \$36-38 million in each of the two previous years. The exploration projects for diamonds in central Slave Structural Province and base-metal drilling projects in northern Slave Province accounted for the majority of the 1993 exploration expenditures. Exploration for diamonds in the Slave Province, with 224 projects, and Keewatin, with 20 projects, accounted for over 90 percent of all the properties worked (267) in 1993. In the Slave Province, at least 80 drilling projects tested 95 targets for kimberlite pipes. At least 35 new kimberlite pipes were reported, of which a number were diamondiferous. Most of the diamondiferous pipes are located in the Lac de Gras area. At least 69 projects in the Slave Province involved soil sampling for kimberlite indicator minerals and 73 involved airborne and/or ground geophysical surveys to identify kimberlite targets.

Companies also explored known or newly discovered kimberlite diatremes in the Mackenzie Mountains, Keewatin, Somerset Island, Baffin Island and Bathurst Island. A new micro-diamond was

discovered by a Geological Survey of Canada party in a minette (lamprophyre) dike sample taken near Gibson Lake, 130 km northwest of Rankin Inlet in the District of Keewatin.

The success of the 1993 diamond exploration activity in the Northwest Territories, particularly in the central Slave Province, should ensure that diamond exploration will continue unabated for a number of years.

Exploration Projects

Northern Slave Structural Province

Hope Bay Volcanic Belt

BHP Minerals Canada Ltd. staked, mapped and sampled the BOSTON 8-17, QUITO, KAMIK and AMAROK (1) claims for precious metals. Airborne magnetometer and VLF surveys were completed on most of its properties in the Hope Bay belt.

BHP Minerals Canada Ltd. drilled 21 312 m in 77 holes to assess a gold-bearing zone in volcanics and completed geological mapping and geophysical surveys on the BOSTON (2) claims. BHP also completed geological mapping and sampling on the CHICAGO and BUFFALO (2) claims.

Southern Copper Corp. mapped, sampled and prospected the SY (2) claims for gold, diamonds and other minerals.

High Lake and Anialik Volcanic Belts

Cogema Resources Inc. completed detailed mapping, sampling, stripping, trenching, geophysical surveying and 440 m of drilling in its search for gold on the LACH (3) property.

Metall Mining Corp. optioned the ANIALIK (4) claims from Continental Pacific Resources Inc. Metall mapped, completed EM survey and drilled 1 346 m in nine holes on the Run Lake base metal deposit. The first hole intersected a copper stringer zone grading 0.91 percent copper over 22.4 m.

BHP Minerals Canada Ltd. mapped and sampled gold-bearing veins, completed 20 line-km of VLF/magnetometer surveys and staked the TLP (5) claims on Prospecting Permit 1285.

BHP Minerals Canada Ltd. drilled 16 holes totalling 1 672 m on its ULU gold claims (6) and completed airborne and ground magnetometer and VLF-EM surveys. The company also mapped and sampled the PULSE, KINDLE and SPARK claims (6) in the same area. Airborne magnetometer and VLF-EM surveys were flown over the PULSE and KINDLE claims.

BHP Minerals Canada Ltd. mapped and sampled the CYGNET and newly staked ROMA claims (33) for gold.

Metall Mining Corp. optioned the MONA (33) claims from Continental Pacific Resources Inc. and completed mapping and EM surveys on the base metal property.

Aber Resources Ltd. continued to explore the HIGH LAKE (33) massive sulphide deposit. Over \$1 million was spent, predominately on 6 000 m of drilling. Three new zones of base metal mineralization - the West, North and Lake zones, were identified.

Hood River Volcanic Belt

Metall Mining Corp. completed 30 line-km of transient EM surveys and drilled two holes totalling 2 035 m on the HOOD RIVER (35) zinc-copper property, located 50 km north of Izok Lake.

Lytton Minerals Ltd. and **New Indigo Resources Ltd.** staked 2.4 million ha in map area 86 H (56), to the east of the Hood River Volcanic Belt, conducted airborne geophysical surveys and collected reconnaissance and detailed heavy-mineral samples over the area.

George Lake-Back River Area

The Back River Joint Venture (**Homestake Mineral Development Company Ltd.**, **Kerr-McGee Corporation** and the **Mac Lab Group**) drilled 6 000 m in 30 holes at Goose Lake (9), 600 m in seven holes at Boot Lake and 300 m in four holes at the Boulder prospect to test gold-bearing iron formation on the BRAU claims.

Kalahari Resources Inc. and **Lumina Resources Inc.** staked numerous claims in the Beechey Lake (9) area to cover ground favourable for a variety of commodities, including gold in iron formation, volcanogenic massive sulphide deposits and diamonds in kimberlites. Grassroots exploration was also conducted.

Etruscan Enterprises Ltd. completed airborne and ground geophysical surveys, geological mapping, prospecting and 3 892 m of drilling in 18 holes on the HACKETT RIVER (38) base metal property owned by Etruscan and Cominco Ltd. The drilling consisted of four holes on the A or Main Zone, 10 holes on the East Cleaver Lake Zone and four exploratory holes. Good intersections with good grade mineralization were located in both zones and a new Knob Hill zone was discovered.

Etruscan Enterprises Ltd. also collected till samples to check for diamond indicator minerals in the Hackett River (58) area. Eight till samples in a 200 m² area returned anomalous gold concentrations ranging from 13 to 545 ppb.

Coast Diamond Ventures Ltd. flew a geophysical survey over its Beechey Lake (64) area claims.

Gerle Gold Ltd., in a joint venture with **Echo Bay Mines Ltd.** flew aeromagnetic surveys, collected till samples and examined aeromagnetic targets on seven claim blocks in the Back River (65) area.

Kennecott Canada Inc. examined four geophysical targets located by last year's survey on the Diasyn property (75). Five till samples were collected, but nothing of interest was discovered and the option was dropped.

MAP 3
MINERAL EXPLORATION AND MINES
IN SLAVE STRUCTURAL PROVINCE, 1993

LEGEND

(20) Areas of Mineral Exploration Activity,
Refer to N.W.T. Table and Text

Gold, Silver

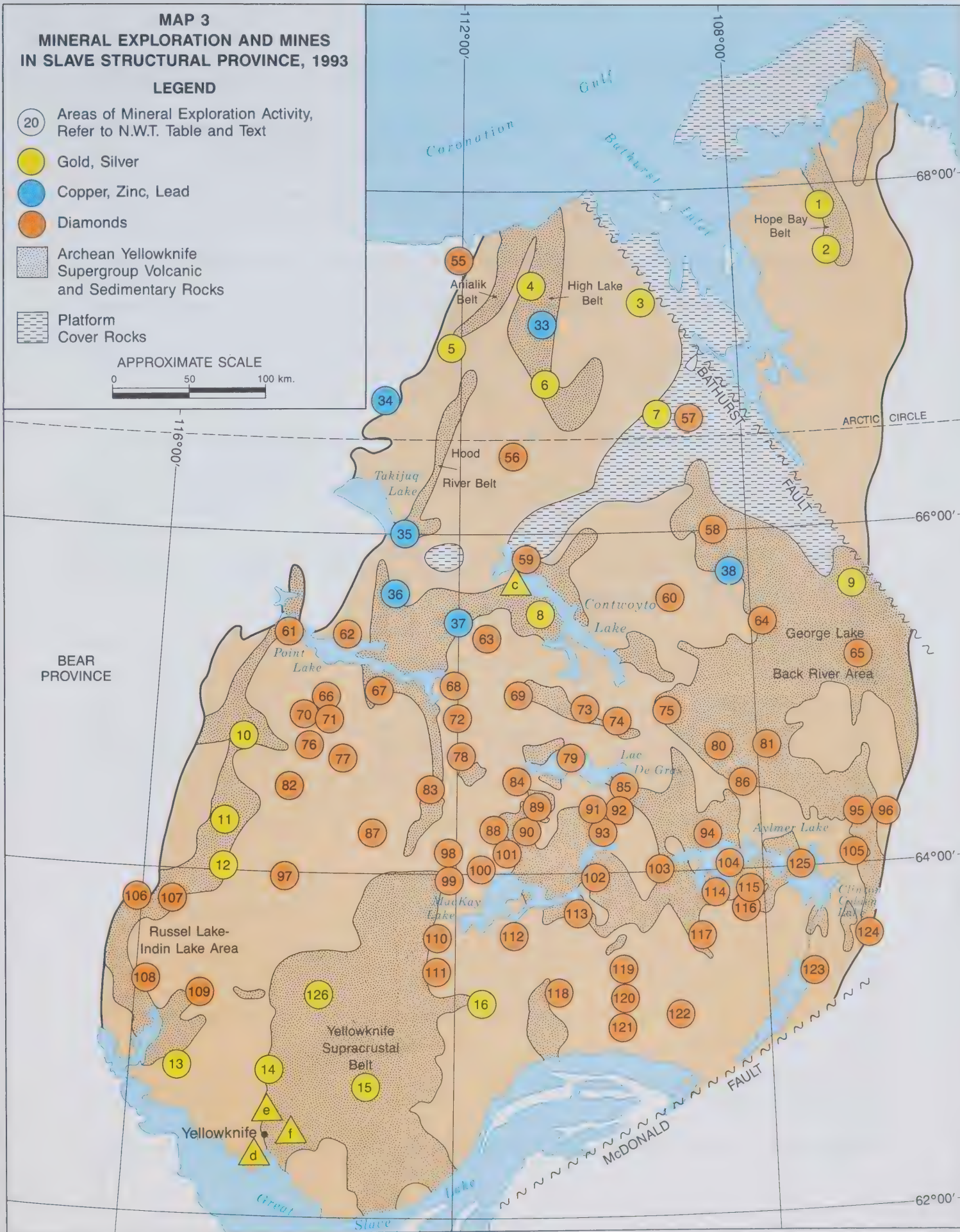
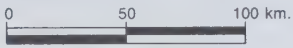
Copper, Zinc, Lead

Diamonds

Archean Yellowknife
Supergroup Volcanic
and Sedimentary Rocks

Platform
Cover Rocks

APPROXIMATE SCALE



Kennecott Canada Inc., in a joint venture with **SouthernEra Resources Ltd.**, collected till samples, completed ground geophysics and drilled 809 m in 13 holes on their Mackenzie District (80) project.

Sanfred Resources Ltd. and **Rocky Mountain Energy Corp.** flew an aeromagnetic survey and collected heavy-mineral samples from eight targets on their property north of Aylmer Lake (81).

Teryl Resources Corp. and **Calco Resources Ltd.** flew a geophysical survey and collected 86 till samples from 22 geophysical targets on their Aylmer Lake (86) property.

Falconbridge Ltd. and partner **Almaden Resources Corp.** collected heavy-mineral samples from eskers and till on their ELF, PAD and HARE (95) claims in the Healey Lake area. They also examined outcrops in the vicinity of "bulls eye" magnetic anomalies located on government aeromagnetic maps.

Geomaque Exploration Ltd. completed airborne magnetic and EM surveys over 19 claim blocks in the Healey Lake (96) area and collected 37 till samples in the vicinity of eight geophysical anomalies.

Contwoyto-Itchen-Point Lakes Area

On the Lupin mine property (c), **Echo Bay Mines Ltd.** drilled 25 holes from the surface to test six targets.

Echo Bay Mines Ltd. drilled 1 961 m in 24 holes on the BARB MINER CAP (8) claims. Thirteen holes totalling 1 257 m were drilled on the OP claim. On the adjacent MUD (8) claim, the company also completed 1 114 m in 16 holes to test two targets.

Echo Bay Mines Ltd. drilled 650 m in eight holes on the BUTTERFLY (8) property, optioned from Cominco Ltd., Cogema Resources Inc. and Aber Resources Ltd.

Metall Mining Corporation explored the IZOK LAKE (36) base metal property with a \$10 million program that included geological mapping, lithogeochemistry, 175 line-km of transient EM surveying and 11 500 m of drilling in 18 holes. A considerable portion of the drilling was focussed on defining the limits of the Inukshuk deposit (250 m east of Izok Lake) which was discovered last year. Another 9 902 m of definition drilling in 76 holes was completed on the Central, North and Northwest zones of the deposit. Mine construction, initially scheduled to begin in 1994, has been shelved pending improved world base metal prices and possible restructuring of Metallgesellschaft A.G., Metall's German parent company.

Despite the postponement of the development of the mine, Metall is continuing to partially fund the hydrographic surveys required to map the sea access to the Coronation Gulf. In addition, two ice strengthened ships are being built in South Korea and will be launched in early 1994. These ships are intended for use in the St. Lawrence, but could be used in the Arctic.

Echo Bay Mines Ltd. drilled 6 500 m in 63 holes on the SKI (36) claims to evaluate gold-bearing banded iron formation.

Gitennes Exploration Inc. mapped the THOM and POINT (36) claims to evaluate the potential for base metals and diamonds.

Metall Mining Corporation completed 70 line-km of transient EM surveys and drilled 904 m in two

holes on the GONDOR (37) property, 60 km east of Izok Lake. The Gondor deposit is held in a joint venture with Noranda Exploration Co. Ltd.

Layfield Resources Ltd., Kingswood Resources Ltd. and Monument Resources Ltd. did till sampling and mapping on their property (59) along the northeast shore of Contwoyto Lake.

Lytton Minerals Ltd., Kestral Resources Ltd. and Golden Lake Resources Ltd. flew airborne geophysical surveys and collected heavy-mineral samples in 76F (60).

Monopros Ltd. did heavy-mineral sampling and flew airborne geophysical surveys in 86H (61).

Lytton Minerals Ltd. and Texas Star Resources Corp. flew airborne geophysical surveys and collected heavy-mineral samples on properties (62) and (63) in 86H.

Tyler Resources Inc. with partner **Jerez Investment Corp.** flew a geophysical survey and collected reconnaissance till samples on their Humpy North (66) property near Whitewolf Lake.

Garden Lake Resources Ltd., RKJ Exploration Ltd. and Aaron Oil Corp. flew airborne geophysical surveys and sampled tills on their Point Lake (67) property.

Lytton Minerals Ltd. flew airborne geophysical surveys and collected reconnaissance and detailed heavy-mineral samples on its wholly owned properties in 76D, E, 86A and H (68).

Tanqueray Resources Ltd., Fibre-Klad Industries Ltd. and Mill City Gold Mining Corp. flew geophysical surveys over the northern part of their Yamba Lake (69) property and did extensive heavy-mineral prospecting. Heavy-mineral concentrates yielded large numbers of chrome diopsides and pyrope garnets, including G-9's and suspected G-10's. A five hole program of 1 259 m tested three geophysical anomalies with down ice indicator trains. Three kimberlite pipes were discovered. The first hole on the Torrie Pipe recovered 152 micro- and 39 macro-diamonds from 161.6 kg of kimberlite core. The second hole on the Torrie Pipe contained 29 micro- and 14 macro-diamonds in 36.2 kg of kimberlite core. Twenty-five of these diamonds were described as clear/white in colour/clarity whereas 17 were champagne or off-white in colour. Results from the Torrie Pipe indicate that it is comparable to Kennecott/DHK's Tli Kwi Cho (DO-27) pipe and BHP/Dia Met's Point Lake Pipe. Three holes tested two other pipes (Sputnik and Sue), but carried lower quantities of diamonds. An extensive winter drilling program including bulk sampling of the Torrie Pipe using large diameter core drill holes is planned for February or March 1994.

Layfield Resources Ltd., Monument Resources Ltd. and partner Toscana Resources Ltd. flew a geophysical survey and collected till samples on their Humpy Lake (70) property.

Pure Gold Resources Inc. in a joint venture with **Ashton Mining Ltd., Atna Resources Ltd., Island-Arc Resources Ltd. and Winslow Gold Corp.** flew geophysical surveys and collected heavy-mineral samples on their HUMPY 1 and 2 claims (71) near Humpy Lake. High numbers of pyrope garnets and some chrome diopsides were found in many of the samples.

Monopros Ltd. flew geophysics and collected heavy-mineral samples in 76D (72).

Pure Gold Resources Inc. with partners **Ashton Mining Ltd., Westview Resources Ltd., Paramount Ventures and Finance Ltd. and Riva Petroleum Ltd.** flew geophysical surveys and collected heavy-mineral samples on their DICK 1 claim (76) south of Humpy Lake. High numbers of pyrope garnets and some chrome diopsides were found in many of the samples.

Winspear Resources Ltd. and **International Vestor Resources Ltd.** completed airborne and groundgeophysical surveys, sampled tills and drill tested magnetic and resistivity anomalies associated with indicator minerals on their Snare Lake (76) property. The first two holes, which were drilled on a single anomaly, intersected kimberlite. The diatreme has a surface area of approximately 14 ha.

Lytton Minerals Ltd. and **Texas Star Resources Corp.** flew a geophysical survey and collected reconnaissance and detailed heavy-mineral samples in 86 A (77).

Winspear Resources Ltd. and **International Vestor Resources Ltd.** with partner **Layfield Resources Ltd.** did a ground geophysical survey and collected till samples on their Lake Providence (78) property.

SouthernEra Resources Ltd. completed airborne and ground geophysical surveys, extensive till sampling and approximately 1 500 m in eight preliminary drill holes on its Humpy Lake (82) property.

Tanqueray Resources Ltd., **Golden Vessel Resources Ltd.** and **Kemano Resources Ltd.** flew a geophysical survey over their Winter Lake (83) property.

Pure Gold Resources Inc. with partners **Ashton Mining Ltd.**, **Island-Arc Resources Ltd.**, **Loumic Resources Ltd.** and **Winslow Gold Corp.** collected heavy-mineral samples and flew geophysical surveys over their RR (87) property, south of Winter Lake.

Monopros Ltd. flew geophysical surveys and did heavy-mineral sampling on its property in 86B (97)

Lac de Gras-Clinton-Colden Lake-MacKay Lake Area

Tyler Resources Inc. completed a bulk till sampling program on its Carat property (73) (the GH claims) that abuts the northeast boundary of the BHP Minerals/Dia Met property at Lac de Gras.

Monopros Ltd. flew a geophysical survey and did heavy-mineral till sampling on its property (74) in 76 C, northeast of Lac de Gras.

Teryl Resources Corp. and partner **Calco Resources Inc.** did ground magnetometer and VLF-EM surveys over eight potential airborne targets on their AMAD (84) claims. Seven holes totalling 1 263 m were drilled, but no kimberlites were located. Three additional targets were to be drilled after freeze-up.

Aber Resources Ltd. in a joint venture with **Kennecott Canada Inc.**, **Commonwealth Gold Corp.**, **KRL Resources Ltd.**, **Westfort Petroleum Ltd.** and **SouthernEra Resources Ltd.** explored the DIAVIK (85) project with ground geophysics, 400 heavy-mineral samples and 5 217 m of drilling on approximately 30 targets. A field processing plant was established to concentrate samples and 40 samples were hand picked on the property, the remainder being sent to laboratories for analysis. Drilling located 15 kimberlite pipes in 1993, bringing the total to 22 pipes on the property. Several of the kimberlites yielded small numbers of diamonds, however analytical results are not yet available. One 77.9 kg sample of 50 m of drill core from the C13 pipe yielded 10 micro- and 3 macro-diamonds as well as a high number of G-10 garnets and chromites characteristic of those found as diamond inclusions. Three holes, totaling 500 m were planned to be drilled on the C13 pipe in October.

**Table 8: BHP/Dia Met Large Core Sampling Results,
Lac de Gras, Northwest Territories, 1992 and 1993**

Kimberlite Pipe	Sample Weight (tonnes)	Carats Recovered (Ct)	Percent Gem Diamonds	Carats per 100 Tonnes	Mean ¹ Value of Diamond (US\$/CT)
Leslie (1)	151.5	65.37	17	43.1	\$89
2	21.2	17.99	6	84.9	N/A
Fox (3)	179.7	61.28	33	34.1	\$81
Koala (4)	49.8	62.11	31	124.7	\$112
Point Lake	161.0	101.0	25	62.7	N/A

Source: Dia Met Minerals Ltd. press releases and reports

¹ Value of entire diamond sample, not just the gem fraction.

N/A Not Available

BHP Minerals Canada Ltd. and **Dia Met Minerals Ltd.** used airborne and ground geophysical surveys, heavy mineral sampling and 6 387 m of drilling to test targets on their Lac de Gras (79) property. Drilling located 16 kimberlites in 1993, in addition to the one found in 1991 and 10 in 1992. The companies announced plans to take bulk samples of 3 000 to 5 000 t from Pipes 3 (Fox) and 4 (Koala) during the winter of 1993-1994. The Fox Pipe will be sampled by large-diameter (about 1 m) reverse-circulation drilling and the Koala Pipe by underground workings. A 112-person camp and a bulk sample processing plant were assembled on site. Of the 26 kimberlites on the property, 16 contain diamonds. (See Table 8).

Prior Resources Ltd., **Optical Data Systems Inc.** and **Anvil Resources Ltd.** collected 25 till samples from their property in the Lac de Gras (88) area. A drilling program was started late in the year.

Kennecott Canada Inc. and the **DHK Group (Dentonia Resources Ltd., Horseshoe Gold Mining Inc. and Kettle River Resources Ltd.)** drilled a number of other holes on targets on the DHK (89) property. Three kimberlite pipes (DD-17, DD-39 and DD-42) have been discovered.

Winspear Resources Ltd. in a joint venture with **Canso Resources Ltd.** and **Consolidated Newgate Resources Ltd.** flew 1 000 line-km of geophysical surveys, sampled tills, did ground geophysics and drilled four holes on their Courageous Lake (90) property. Four geophysical targets were drilled but no kimberlites were located. The companies completed ground geophysics and till sampling on the adjacent Salmita (90) property.

Kennecott Canada Inc. mapped, did ground geophysics and basal till sampled the **ATW Resources Ltd.**

(**Almaden Resources Ltd.**, **Troymin Resources Ltd.**, **Williams Creek Exploration Ltd.**) (91) property south of Lac de Gras. Some indicator minerals were found. A number of airborne geophysical anomalies were eliminated. One target was drilled with one hole of 80 m length, but it was not a kimberlite. Other targets were identified and prioritized and those under lakes will be tested with ground geophysical surveys after freeze-up.

Kennecott Canada Inc. and the **DHK Group** drilled 38 holes on the Tli Kwi Cho Pipe (92) on the WO claims as part of a larger drill program (103 holes, 11 488 m) on the WO claims. Kennecott also mapped, carried out ground geophysics and collected till samples. In September, plans were announced to bulk sample the Tli Kwi Cho Pipe by sinking a spiral decline to a depth of 115 m and extracting a 5 000 t sample which will be trucked to a processing plant built on the Con mine property in Yellowknife. Prior to the sale of the Con mine, Kennecott owned it through the acquisition of Nerco Inc.

Adex Mining Corp. and **Lucero Resources Ltd.** completed airborne geophysics and collected 45 basal till samples on their MacKay Lake (93) property. Twelve geophysical anomalies were recognized, but no indicator minerals were recovered from the tills.

Winspear Resources Ltd. and partner **Adex Mining Corp.** completed 4 500 line-km of airborne geophysical surveys and sampled tills on their Aylmer Lake West (94) property.

Winspear Resources Ltd. and **Layfield Resources Ltd.** flew 6 700 line-km of geophysical surveys, did ground geophysics and sampled tills on their Jolly Lake East (98) and West properties.

Garden Lake Resources Ltd. flew geophysical surveys and sampled tills on its Jolly Lake (99) property. G-10 garnets were found in seven samples and two geophysical anomalies are targeted for drilling.

Garden Lake Resources Ltd. and **RJK Exploration Ltd.** flew airborne magnetometer and EM surveys, collected heavy-mineral till samples and prospected their Warburton Bay, Lac du Rocher (100) property. G-10 garnets were recovered from heavy-mineral concentrates and two geophysical anomalies were located. These anomalies are reported to be identical to those of the kimberlite pipes at Lac de Gras.

Calco Resources Inc. and **Tako Resources Ltd.** flew a geophysical survey and collected till samples on their PL 1-5 (101) claims, south of Courageous Lake. Eight targets were identified.

Layfield Resources Ltd. and **Monument Resources Ltd.** flew a geophysical survey, sampled tills and mapped their property (102) along the northeast shore of Contwoyto Lake.

Tyler Resources Ltd. flew geophysical surveys, collected bulk till samples and drilled 2 500 m in 19 holes on its CRYSTAL (103) property, west of Aylmer Lake.

Barexor Minerals Ltd. flew a magnetometer survey of its property (104) in the Aylmer Lake area.

Gerle Gold Ltd. flew magnetometer surveys and collected 43 heavy-mineral samples on its GG East (105) property in the Clinton-Colden Lake area. Six geophysical anomalies were identified on five claims.

Southern Slave Structural Province

Russell Lake-Indin Lake Area

BHP Minerals Canada Ltd. staked and mapped the EL TESORO and DULCE (10) claims and mapped and sampled the TAIGA, TUTGIK and HELA (12) claims south of Chalco Lake.

Winspear Resources Ltd. with partners **Apex Energy Corp.**, **Consolidated Newgate Resources Ltd.** and **Sarabat Gold Corporation** completed 7 100 line-km of airborne geophysics and some till sampling on their Shamrock Lake (10) property in their search for kimberlite.

Royal Oak Mines Inc. purchased the Colomac gold mine (11) in 1993. Drilling totalled 4 522 m in 48, predominately shallow drill holes. One deep drill hole intersected 75 m of 2.33 g/t gold to a vertical depth of 333 m, which is 150 m below the currently planned pit bottom.

Etruscan Enterprises Ltd. completed airborne magnetic and EM surveys on the INCA, INDIN, LEX, SOUTH, GOLDEN PRINCE, KING, AZTEC, FRED (12) claim group.

Globaltex Industries Inc. started to dewater old exploration shafts on the NORTH INCA and LEXINDIN (12) gold properties to sample underground workings and assess the feasibility of production.

Athabaska Gold Resources Ltd., with joint venture partners **Gitennes Exploration Inc.** and **Consolidated Ramrod Gold Corporation**, conducted airborne and ground geophysical surveys to outline gold-bearing, sulphide-rich iron formation on the SUF (12) claims at Damoti Lake. Eleven holes, totalling about 1 400 m were drilled in October. Significant gold values were intersected in some holes.

Mr. Dave Smith of Yellowknife drilled 60 m on the Seven-Ores gold showing on the BONE claim (13) in the Russell Lake area.

Jonpol Resources Ltd. flew geophysical surveys and did till sampling on its claims (106) in the Labrish Lake area.

Aur Resources Ltd. staked claims (107) in the Basler Lake area, along the boundary between the Bear and Slave provinces.

Aur Resources Ltd. and **Jonpol Resources Ltd.** flew geophysical surveys, collected regional till samples from their Pollock Lake (108) properties and began a drilling program in October to test five targets.

SouthernEra Resources Ltd., **Noble Peak Resources Ltd.** and **Major General Resources Ltd.** collected till samples on their properties (109), northwest of Wheeler Lake.

Yellowknife Supracrustal Basin

Athabaska Gold Resources Ltd. decided to mine a 3 500 t bulk sample for metallurgical testing at its Nicholas Lake gold (126) property. If the results are favourable, the company will begin the design of a mine which will employ between 70 and 100 workers. The company hopes to be in production by October 1995 contingent on the results of the metallurgical and feasibility studies.

Tremingo Resources Ltd. and **DRW Geological Consultants Ltd.**, also known as the Yellowknife Greenstone Belt Syndicate, trenched and sampled various gold properties in the Sito Lake- Clan Lake (14) area. Tremingo also continued to explore for additional reserves at its TOM and PTARMIGAN gold mine properties (f).

Home Ventures Ltd. completed airborne magnetometer and EM and ground IP surveys on the CHEW, DICK and ANNA (15) claims in the Cameron River Volcanic Belt.

Nebex Resources Ltd. mapped and prospected the BRIAN (16) claims in the Camsell Lake Volcanic Belt. Samples collected during reconnaissance gave encouraging base and precious metal assays.

Nebex Resources Ltd. drilled two holes on the Sam Otto zone in the Walsh Lake (e) area to test the extent, at depth, of near-surface gold zones. Nebex drilled 10 holes on the NGX and Kidder shear zones (e) and carried out detailed geological mapping and IP surveys on the NGX, Kidder and Shear 20 (Daigle Lake) zones, all on the North Belt claims. The North Belt claims, located immediately north of the Supercrest property and optioned from Royal Oak Mines Inc., contain three sub-economic gold deposits: the Crestaurium, the Lynx and the GKP.

Royal Oak Mines Inc. drilled 11 holes totalling 3 506 m on the MARLIN, MIRAGE and SLAVE (d) claims to test gold-bearing shear zones under the water of Yellowknife Bay.

North Shore of Great Slave Lake Area

Pure Gold Resources Ltd. and partner **Tenajon Resources Corp.** collected 123 soil samples from their CROSS (110) property.

Monopros Ltd. carried out heavy-mineral sampling and flew geophysical surveys over its claims (110) in National Topographic System (NTS) map areas 85 I, O and P.

Pure Gold Resources Ltd. and partners **International Northair Mines Ltd.** and **Camnor Resources Ltd.** collected 76 soil samples from their Rose Lake (111) property.

Winspear Resources Ltd. in a joint venture with **Commonwealth Gold Corp.**, **Amarado Resources Ltd.** and **Consolidated Newgate Resources Ltd.** flew an 11 400 line-km geophysical survey over their Camsell Lake (112) property.

Kennecott Canada Inc. did ground geophysical surveys and collected 136 heavy-mineral til samples to define and prioritize airborne geophysical targets on **Kalahari Resources Ltd.**'s MacKay Lake (113) property. Three holes totalling 218 m were drilled into three targets.

Mountain Province Mining Inc. flew a geophysical survey and collected 600 reconnaissance heavy-mineral till samples from its CJ (114) and AK (119) claims. Six anomalous areas were defined by pyrope and/or chrome diopside minerals. A closely spaced till sampling program was initiated in the area of indicator mineral sites and 14 geophysical targets.

Tyler Resources Ltd. flew geophysical surveys and till sampled on its GEM (115) property, south of Aylmer Lake, and its DEB (117) property, at the north end of Fletcher Lake.

Riley Resources Ltd. and **ITL Capital Corp.** had Canamera Geological collect 205 overburden samples

from their property in the Lac de Charloit (116) area. An airborne geophysical survey was also completed. Five areas have combined geophysical and heavy-mineral anomalies.

SouthernEra Resources Ltd., in a joint venture with **Noble Peak Resources Ltd.** and **Major General Resources Ltd.**, carried out airborne and ground magnetic surveys and till sampling on their MacKay Lake (118), Clinton-Colden Lake (120) and Artillery Lake (123) properties.

Teryl Resources Corp., **Calco Resources Ltd.** and **Major General Resources Ltd.** formed the International Diamond Syndicate which flew a geophysical survey and collected approximately 800 till samples from about 130 claims in the area southwest of Aylmer Lake (121) and southeast of Clinton-Colden Lake (124).

Teck Corp./Cominco Ltd. in a joint venture with **Gerle Gold Ltd.**, flew magnetometer surveys and collected till samples from their Doyle Lake (122) property. The joint venture flew AEM surveys over 52 of the previously identified magnetic anomalies located and staked last year in the Clinton-Colden Lake (125) area. In addition to the joint venture work, Gerle Gold separately collected 58 samples in the Doyle Lake area and 125 samples in the Clinton-Colden Lake area.

Gerle Gold Ltd. flew magnetometer surveys and collected 43 heavy mineral samples on its wholly-owned GG East (125) property in the Clinton-Colden Lake area. Six geophysical anomalies have been identified.

Bear Structural Province

BHP Minerals Canada Ltd. mapped and prospected for gold on the NUNA claims (7) near the Hood River, near Bathurst Inlet.

Noranda Exploration Company Ltd. and **Rhonda Mining Corporation** drilled an IP anomaly in the vicinity of stratabound copper-zinc mineralization on claims and prospecting permits (34) in the Inulik Lake area.

In the Kikerk Lake area, east of Coppermine, **Monopros Ltd.** did heavy-mineral sampling and flew geophysical surveys over claims (45) in its search for kimberlites.

Caledonia Mining Corp. explored for diamonds in alluvial and beach gravels of the Coppermine River (45) and coast, Tree River (55) area and the Bathurst Inlet (57) area. Samples were collected from the estuaries of 12 major rivers and approximately 100 minor rivers. A zone approximately 3 to 6 m in width and 850 m long containing anomalous base metals (up to 0.6 percent copper) was discovered in the Tree River area.

Southeast Mackenzie District

Fortune Minerals Ltd. prospected for gold and copper on its CARO claims near Nonacho Lake (17).

Fortune Minerals Ltd., in a joint venture with **Teck Corp.**, mapped and carried out an IP survey in its search for gold, silver and copper on their FD claims (18) in the Salkeld Lake area.

Great Slave Lake Plain

Jonpol Resources Inc. flew geophysical surveys and sampled tills for kimberlite indicator minerals on its claims in the Lac Grandin area, north of Lac la Martre (43).

Aur Resources Ltd. drilled 144 reverse-circulation holes totalling 1 555 m, collected 473 till samples and flew a 31 000 line-km aeromagnetic survey and completed a ground magnetic survey and mapped on its claims in the Lac la Martre area (44).

Major General Resources Ltd., as operator for the MGJ Joint Venture (**Calais Resources Ltd.**, **Arbor Resources Inc.**, **Eureka Resources Ltd.**, **Kingston Resources Ltd.**, **Major General Resources Ltd.**, **J. Montgomery**, **Vera Cruz Minerals Corp.** and **Wealth Resources Ltd.**), staked five properties in the Lac la Martre-Horn Plateau area (44) and flew airborne magnetic surveys. Several targets were located.

Cordillera

San Andreas Resources Corporation continued its 1992 exploration program on the Prairie Creek property (31) with 25 holes totalling 6 746 m. Fifteen holes were drilled into the stratabound and vein deposits of Zone 3 and 10 holes along the trend of the Whittaker Formation for up to 7 km south of Zone 3. UTEM downhole and surface geophysical surveys were tested in Zone 3, and field mapping, sampling and trenching were carried out over the northern claims. Additional ground was staked in the northeast bringing the total area of the property to almost 12 100 ha. San Andreas completed the purchase of the property in June from Nanisivik Mines Ltd.

Sway Resources Inc. collected an 11 t bulk sample from the Mountain Diatreme (42) property to analyse for indicator minerals and diamonds. The Mountain Diatreme is the largest of a small group of kimberlite or lamproite pipes that occur in the Sayunei Range of the northern Mackenzie mountains.

NDU Resources Ltd. identified eight other lamproite bodies in three clusters and several float occurrences near the Mountain Diatreme (42) during a three week reconnaissance program.

District of Keewatin

Noranda Exploration Co. Ltd. prospected for gold and collected samples for lithogeochemistry from uranium-gold-bearing feldspathic arenite beds at Sandybeach Lake (19).

Placer Dome Inc., on behalf of **MH Resources Inc.**, drilled eight holes, totalling over 1 000 m, in carbonate-altered mafic volcanics in the Hook Lake and Joyce showing areas on the SPI claims (20) in the Turquetil Lake auriferous zone. The property contains an 11.5-km long carbonatized shear zone. Previous drilling along the zone outlined preliminary geological reserves of 454 000 t grading 6.2 g of gold per t.

Cumberland Resources Ltd., in a joint venture with **Comaplex Minerals Corp.**, drilled 1 200 m in 16 holes and carried out VLF, EM, HLEM and magnetometer surveys over six grids on gold-bearing

banded iron formation on the NAT claims (21) near Meliadine Lake. Two drill holes on target area F in the West Meg area intersected good gold values over widths of up to 27.58 m.

R.A. Olson Consulting Ltd. prospected, on behalf of clients, prospecting permits covering metasedimentary rocks in the Archean supracrustal basin between Wager Bay and Committee Bay (22, 23, 24).

MH Resources Inc., a consortium of **Dejour Mines Ltd.**, **Noble Peak Resources Ltd.** and private investors, completed VLF, magnetometer Deep Pulse EM surveys, rock chip and soil geochemical sampling on the Mag Lake massive sulphide showing, a zinc-copper-gold prospect on the MAG (32) claims, northeast of Heninga Lake.

Cogema Resources Inc. explored for uranium on a block of leases, claims and prospecting permits covering metasediments in the Judge Sissons Lake area (39). A total of 10 953 m were drilled in 34 holes, of which 7 200 m in 26 holes were drilled on the Andrew Lake grid. The supracrustal sequence close to the margins of a prominent fluorite granite intrusion was mapped and 200 line-km of gravity, EM and magnetometer surveys were completed on PP 1264 (39).

Cameco Corp. prospected for uranium on claims and PP 1398-1404 (40) and PP 1455-1458 (41) covering sedimentary rocks of the Amer Group and the Thelon Formation, north of Aberdeen Lake.

Leeward Capital Corp., in joint venture with **Skeena Resources Ltd.** and **Connecticut Development Corporation** (33.3 percent each), drilled eight holes into the diamond-bearing Outlet Bay diatreme on Dubawnt Lake (46). No diamonds were recovered from the 1 467 m of kimberlite core but the indicator minerals recovered suggests that the area has diamond potential. The Outlet Bay diatreme covers a 20.2 ha. In early 1993, a sample of the diatreme was reported to contain one gem-quality microdiamond and one G11 pyrope garnet from one of the four 60-70 kg samples taken and analyzed. The Dubawnt area contains a large area of ultrapotassic flows, dykes and pyroclastic assemblages, that appear to have geochemical affinities with potash-rich kimberlite and lamproite rocks. A major mining company resampled the Outlet Bay Diatreme. The results are not yet available.

Gitennes Exploration Inc. prospected aeromagnetic anomalies and surface targets on the AC claims (47) covering Christopher Island volcanics, northwest of Angikuni Lake.

Leeward Capital Corp., **Melinga Resources Ltd.**, **Westmin Ventures Inc.**, **Connecticut Development Corp.**, **Troymin Resources Ltd.** and **Royal Bay Gold Corp.** completed the first phase of a diamond exploration program on the ICE claims (48) and PP 1348-1358 and 1458 (49) covering Christopher Island volcanics between Angikuni and Yathkyed lakes. Twenty-one targets, including nine exposed breccia pipes, one 1981 core sample location and 11 aeromagnetic anomalies were sampled and mapped. Ground magnetometer surveys were completed over most targets.

Cumberland Resources Ltd., **Major General Resources Ltd.** and **Gerle Gold Ltd.** collected till samples for diamond-indicator minerals on the LUK claims (50) covering Christopher Island volcanics and Thelon Formation sediments between Baker Lake and Pitz Lake.

The Geological Survey of Canada discovered a 270 micron diameter micro-diamond in a sample collected in August 1993 from a minette (lamprophyre) dike on claims owned by **Cumberland Resources Ltd.**, **Comaplex Minerals Corp.** and **Manson Creek Resources Ltd.** near Gibson Lake (51), 130 km northwest of Rankin Inlet.

Arctic Islands

Rhonda Mining Corporation explored the Piling Group in the Foxe Fold Belt on Baffin Island, tracing the Black Angel lead-zinc trend from Greenland. The company explored on Prospecting Permits 1308-1311 (25) and did regional reconnaissance from coast to coast throughout the belt.

Cominco Ltd. explored for carbonate-hosted lead-zinc deposits in the Cornwallis lead-zinc district. The company completed a ground geophysical survey on its Abbott River (26) property on Cornwallis Island.

Cominco Ltd. did reconnaissance exploration for lead-zinc deposits on the Judge Daly Promontory (27) of northern Ellesmere Island.

Cominco Ltd. completed airborne geophysical surveys of Prospecting Permits 1405-1418 (28) for base metals on south-central Victoria Island, north of Cambridge Bay.

Aber Resources Ltd. and joint venture partner **Noranda Inc.** did stratigraphic mapping and drilled 1 091.2 m in 19 holes to test stratiform copper prospects on the DUR and DAR claims (29) and adjacent Prospecting Permits 1252-1263 west of Hadley Bay, Victoria Island.

Covello-Bryan and Associates did reconnaissance mapping and prospecting of Prospecting Permits 1300-1303, 1419-20 and 1435-1445 on Victoria Island (30) for **Aber Resources Ltd.** Exploration is for copper, nickel and platinum group metals (PGM's) in a Noril'sk-type setting.

Cyclone Capital Corporation with partners **Breckenridge Resources Ltd.**, **Cominco Limited**, **Westward Explorations Ltd.**, **Westpine Metals Ltd.** and **Alpine Exploration Corp.** flew a 30 000 line-km low-level magnetometer survey, did a ground magnetometer survey, geological mapping and heavy-mineral sampling on their Somerset Island (52) claims. They drilled 1 160 m in 12 holes on eight properties. Two hundred and ninety-one drill core and surface kimberlite samples were sent to be analysed for heavy mineral and diamond content. At least one new kimberlite was found by drilling and three spectacular new kimberlite pipes were found at the end of the field season by Dr. J. Pell, a DIAND geologist. The pipes have been named the Nikos, JP 1 and JP 2.

BHP Minerals Canada Ltd. briefly visited the Creswell Bay area (52) of Somerset Island, south of the Cyclone et al claims.

Lumina Investment Corp. did satellite image analysis and collected approximately 300 stream sediment and some till samples for heavy-mineral analysis from its claims (53) and Prospecting Permits 1315-1321 and 1346 on the Brodeur Peninsula of Baffin Island. One new kimberlite pipe was discovered that contained abundant pyrope garnets and chrome diopsides.

Cyclone Capital Corporation completed an aeromagnetometer survey, prospected and increased its land holdings on Bathurst Island (54) where a large diatreme of possible lamprolitic or kimberlitic affinity was discovered.

APPENDIX

World and Lac de Gras Diamond Overviews

Overview of the Diamond Industry

Introduction

This section has been written to provide a global perspective on diamond mining. It covers both the technical aspects of where diamonds are found and a discussion on the economics of exploration and production. The major producing nations are identified.

Kimberlite Pipes and Diamond Mines

The host rock for the majority of diamond mines in the world is known as kimberlite. Kimberlite is a rare variety of volcanic rock. Technically, kimberlite is defined as a volatile-rich potassic ultrabasic igneous rock which is emplaced rapidly as a violent intrusion that originates at great depth. Kimberlite most often occurs as carrot-shaped, vertical bodies termed pipes or diatremes and less commonly as tabular dykes and sills. Kimberlite pipes are generally circular, oval or irregular in shape. Natural diamonds are formed deep in the earth's interior at depths exceeding 160 km. Diamonds are found dispersed in some but not all kimberlite pipes. Diamonds are believed to have been formed separately from the kimberlite source and to have been driven to the earth's surface by the kimberlite carrier material during the emplacement of the kimberlite pipe.

The world's producing kimberlite pipes are concentrated in the core of very old Precambrian continental shield areas (cratons greater than 2.7 billion years old) and in younger platform rocks overlying these shields in areas such as southern, eastern and western Africa, and Russia/Sakha. The Slave Structural Province in the Northwest Territories, with its Lac de Gras kimberlite pipes, represents a shield area. The kimberlite pipes in the Fort à la Corne area of Saskatchewan are examples of pipes in the younger platform rocks overlying the Precambrian shield or basement. Secondary alluvial diamond deposits, such as the stream-bed, offshore-marine and onshore-beach deposits of Namibia, are derived from the transport of diamonds from weathered pipes. In Namibia, the source pipes are located hundreds of kilometres to the east of the Namibian coast. Diamonds are also mined from concentrations in weathered or eluvial material near or overlying low-grade pipes.

Economic kimberlite and lamproite deposits are rare. Approximately 5 000 kimberlite and lamproite pipes have been identified around the world. Since diamond mining began, approximately 25 pipes (including one lamproite pipe) have been primary diamond producers (one out of 200) and 16 of these are currently producing. Hence, only a very small proportion of pipes prove to contain diamonds in viable quantities to support mine production. It is difficult to quantify the number of eluvial and alluvial diamond occurrences that result from the weathering of kimberlite pipes as they vary in size and economic importance (value).

Economic kimberlite pipes around the world have ranged in surface areas from about one ha to 146 ha, with a median value of about 24 ha. They have been mined to depths of 1.5 km and they diminish in cross-sectional area with depth, like a carrot.

A diamond mine may have a long life. In the Kimberly area of South Africa, three out of five mines (pipes) discovered in 1871 are still producing. With modern high-tonnage mining methods, a pipe may have a mine life of 20 to 40 years or more.

Kimberlite pipes commonly occur in clusters or fields, with groups of pipes in each cluster ranging from three to 400 or more. Larger groups can occur in a cluster area of 50 km or more in diameter. Some clusters are totally barren of diamonds and in producing areas, the ratio of uneconomic pipes to producing pipes may vary considerably.

Economics of Diamond Exploration and Production

Throughout the world, exploration activities are directed to finding deposits with sufficient high-quality diamonds to make mine production viable. The economic risk associated with financing a grassroots diamond exploration program to the advanced development stage and to commercial production is very high. The investment devoted to establishing economic diamond deposits represents a tradeoff of risk versus reward, that is considered to be of a higher magnitude than the risk versus reward profile for other mineral commodities.

From 1871 to the 1950s, South Africa dominated world diamond production. However, the application of modern geological and geochemical concepts in recent decades has resulted in successful exploration that has created major diamond mining industries in a number of other countries.

Botswana, the Russian Federation and Sakha Republic (both of the Commonwealth of Independent States), South Africa, Angola, Namibia and Australia are the major producers. As shown in Table 1, economic diamond pipes are rare and (some) good ones are very valuable.

In 1992, these six countries accounted for 89 percent of global rough-diamond production by value. Except for Namibia and Angola, which produce from alluvial deposits, these countries produce diamonds from pipe deposits.

Grades of economically viable pipes range from about 12 carats to over 200 carats per 100 t. Potential producing pipes may have large variations in the quality and size of diamonds. Hence, large bulk samples containing 5 000 carats to 10 000 carats and ranging from 3 500 t to 30 000 t are required to establish the value of the pipe and the economics of production.

The world's past and currently producing pipes, a total of 25, are estimated to have a gross production value, to a depth of 300 m, ranging from less than \$1 billion¹ to \$35 billion, with a median value of about \$6 billion.

A major economic pipe could have 25 percent gems, 25 percent near gems and 50 percent industrial diamonds; contain 60 to 80 carats of recoverable diamonds per 100 t and have an average value of about \$80 to \$115 per carat. This pipe, if mined at a production rate of five million t of ore per year (13 700 t per day), could generate gross (sales) revenues of \$216 million to \$414 million annually, assuming a 90 percent netback to the mine profit centre.

¹ All monetary amounts are in United States dollars unless otherwise stated.

TABLE 1

VALUE OF DIAMOND PRODUCTION IN SELECTED COUNTRIES, 1992 ¹		
COUNTRY	PIPES IN PRODUCTION	PRODUCTION VALUE (US\$ Millions) ²
Botswana	3	1 553
Russia/Sakha	4	1 240
South Africa	6	906
Angola	*	961
Namibia	*	583
Australia	1	460 ³
Others	1	710

* Production in these regions is from alluvial and eluvial operations.

¹ Preliminary - Source of Production Values: Ashton Mining Limited, Australia

² US\$ - United States Dollars

³ Some production from alluvial ground at the Argyle mine

In 1950, world production of rough diamonds was 14 million carats. Since then production has increased remarkably and over the past 10 years it has doubled. World rough-diamond production, from some 20 countries, is approximately 100 million carats with a market value of about \$6 billion. Approximately 40 percent of this production is classified as industrial diamonds. The balance is used in the production of diamond jewellery and comprises approximately 15 million carats of gem and 45 million carats of near-gem goods. The gem and near-gem categories are determined on the basis of the quality of the diamond.

Although diamonds in the gem category only account for approximately 15 percent of total world diamond production, they represent about 80 percent of the total production value. Gems and near-gems account for about 98.5 percent of the total production value.

Natural industrial diamond production, derived from kimberlite and lamproite pipes, is approximately 40 million carats per annum, with a value of approximately \$100 million. Over 40 percent of this production comes from Australia's Argyle mine (a lamproite pipe). Natural industrial diamonds have progressively lost market share and small synthetic diamonds now dominate the industrial market. Natural industrial diamonds currently account for no more than 20 percent of total world consumption.

The cutting and polishing of diamonds results in considerable material loss, particularly in the near-gem category. Overall, losses are estimated at approximately 75 percent of total rough-cuttable diamond carats (60 million carats per annum of gem and near-gem diamonds) entering the polishing centres. This leaves some 15 million carats of total annual worldwide polished production, with a value of approximately \$9 billion. This represents added value of approximately \$3 billion above the value of the rough gem and near-gem diamonds.

The Lac de Gras Diamond Play

Introduction

The diamondiferous kimberlite pipes identified in the Lac de Gras diamond play have similar characteristics to those in the diamond fields of South Africa, Botswana and Russia/Sakha.

This section covers the background and current status of the Lac de Gras diamond play. The potential for the development of a mine(s) is discussed as well as the possibility for socio-economic benefits which would accrue to the Northwest Territories.

Diamond Exploration in the Lac de Gras Area

In November 1991, Dia Met Minerals Ltd. in a joint venture with BHP Minerals Canada Ltd. announced the discovery of a diamondiferous kimberlite pipe at Point Lake, near Lac de Gras, 320 km northeast of Yellowknife, Northwest Territories (Map 4).

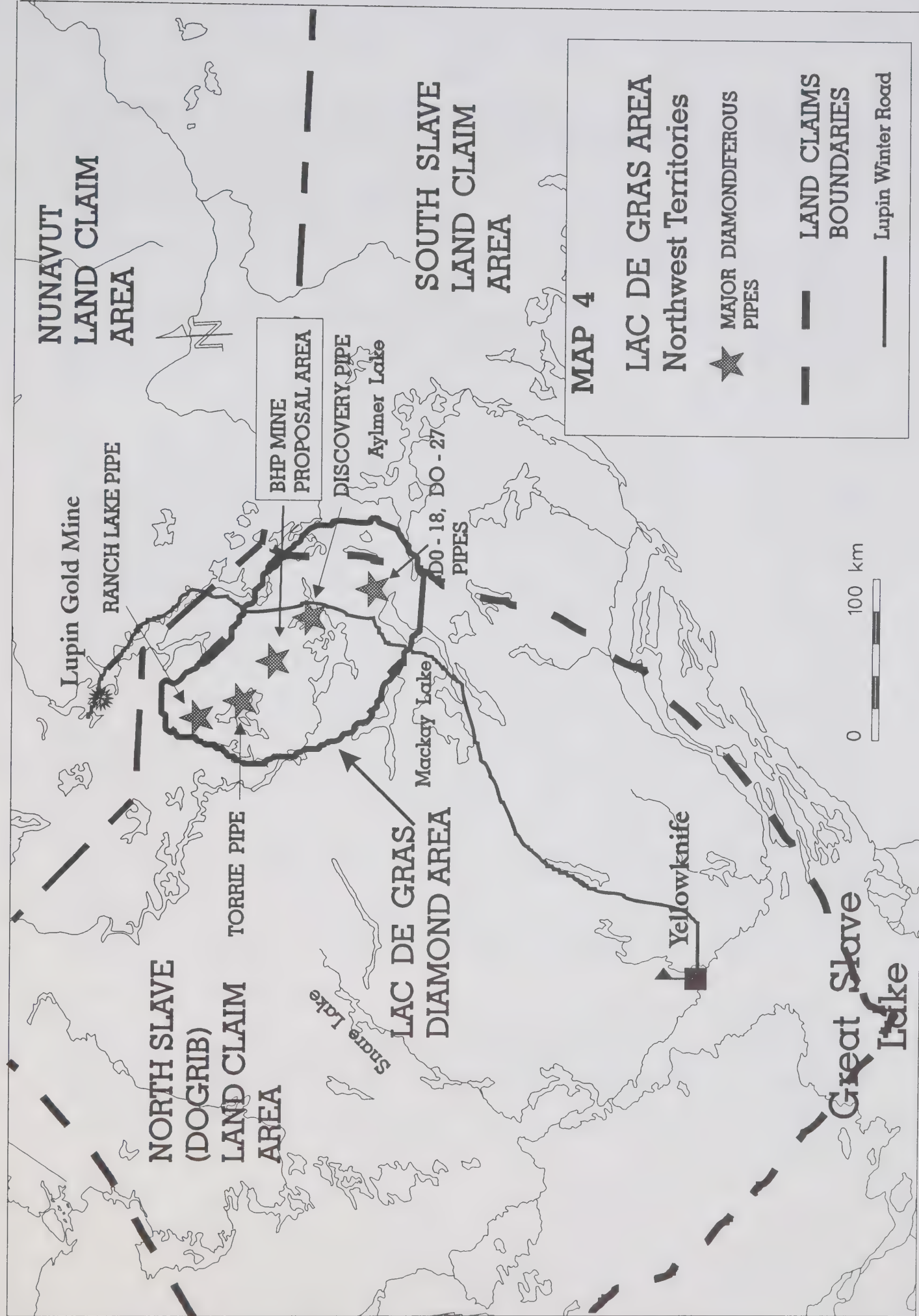
Only two major Canadian mining groups (Cominco Ltd. and Falconbridge Mines Ltd. with its sister company, Canadian Superior Exploration Ltd.) conducted diamond exploration in the Northwest Territories prior to the discovery of pipes at Lac de Gras. South Africa's De Beers Consolidated Mines Ltd. has operated a Canadian exploration subsidiary (under the names of Hard Metals Ltd., Diapros Canada Ltd. and Monopros Ltd.) in Canada over the past 30 years and has explored for diamonds in the Northwest Territories since 1973.

The chairman of Dia Met, Charles Fipke, has explored for diamonds in the Northwest Territories since 1981, when he operated C.F. Mineral Research Ltd. in a joint venture program with Falconbridge Mines Ltd. and Canadian Superior Exploration Ltd., in the Mackenzie River valley. De Beers had previously found kimberlite indicator minerals in the Fort Norman area, Mackenzie Valley, but the source kimberlite pipes had not been located. In 1984, when funding for this exploration program by Falconbridge and Canadian Superior ceased, Fipke formed a public company, Dia Met, to continue exploring the ground near De Beers' claims.

In 1989, Dia Met staked its first claims in the Northwest Territories in the Lac de Gras area and in 1990, Dia Met formed a joint venture with BHP to conduct exploration in the area. BHP is a subsidiary of Australia's giant mining, petroleum and steel company, Broken Hill Pty. Co. Ltd. The BHP Minerals Group is one of the world's largest and most diverse mining enterprises.

Fipke's persistent ten-year scientific exploration effort in tracing the kimberlite indicator mineral train (sand-sized grains of pyrope garnet and other diagnostic minerals) in the glacial soils was finally rewarded in 1991, when the Dia Met/BHP joint venture drilled the discovery Point Lake Pipe, some 600 km east of the first location of kimberlite indicator minerals near the Mackenzie River.

As a result of Fipke's efforts, the Lac de Gras diamond play is the centre of the current diamond exploration effort in the Northwest Territories. The Dia Met/BHP announcement set off the largest staking rush in Canadian mining history. Other areas with known kimberlite pipes that are being explored are Somerset Island (25 pipes and dikes) and the Brodeur Peninsula of Baffin Island.



MAP 4

LAC DE GRAS AREA
Northwest Territories

★ MAJOR DIAMONDFEROUS
PIPES

— LAND CLAIMS
BOUNDARIES

— Lupin Winter Road

Kimberlite-type pipes have also been identified in the Dubawnt Lake area, District of Keewatin and lamproite-pipes occur in the Mackenzie Mountains area.

Since 1991, more than 70 kimberlite pipes have been identified in the Lac de Gras cluster in an area roughly 160 km long and 115 km wide (Map 4). At least 12 of these pipes, on properties held by three mining groups, have returned encouraging diamond counts from drill cores. To date, 97 pipes (including the Lac de Gras cluster) have been reported northeast of Great Slave Lake, in the Slave Geological Province.

A large number of junior Canadian mining companies have established a land position and exploration programs in the Lac de Gras diamond play and a number of them have farmed out their properties under option agreements to the few major mining companies operating in the Lac de Gras play. Total staking in the Northwest Territories from October 31, 1991 to March 4, 1994, mainly for diamonds, amounted to 19.5 million ha (195 065 square km).

The most advanced exploration project is on the Dia Met/BHP joint venture property at Lac de Gras, where some 26 kimberlite pipes have been identified. During 1992, a 160 t sample taken from the Point Lake discovery pipe yielded 101 carats and 25 percent of the diamonds were of gem quality (Map 4, Table 8 on page 33 in main text). During 1992 and 1993, additional large samples ranging in size from 49.8 t to 179.7 t were taken from four pipes, located near Exeter Lake, about 30 km northwest of the original Point Lake discovery pipe. Drill bulk sampling indicated good commercial potential for these pipes. As a result, the joint venture is conducting a greater than \$10-million² program by extracting large bulk samples and processing the material at a diamond recovery plant located on site, near Exeter Lake. Samples of 3 500 t and 5 000 t are being taken from Pipes 4 (Koala) and 3 (Fox) respectively. One pipe is being sampled by underground mining and the other pipe is being sampled by large-diameter drilling.

In September 1993, Dia Met/BHP announced the results from bulk sampling of pipes 1, 2, 3 and 4 (Table 8, on page 33 in main text). A 49.8 t sample taken from Pipe 4 (Koala) returned 1.24 carats per t, an average value of \$112 per carat and a gem proportion of 31 percent. For comparison purposes, the Jwaneng pipe in Botswana, possibly the world's richest diamond mine, has a grade of 1.40 carats per t, an average value of \$100 per carat and a gem proportion of 50 percent. The results of large samples taken from the pipes during 1992 and 1993 are shown in Table 8.

On December 9, 1993 results from four 15 cm diameter core holes into Pipe 4 were released. Some 11.41 t were processed and yielded 11.06 carats (97 carats/100 t).

Diamonds approximately 2 carats in weight recovered from Pipe 4 were reported by one expert to be valued at \$1 000 per carat. The gems were classified in the E-F range, among the fine white diamonds.

Potential Diamond Mines in the Lac de Gras Area

The existence of a number of promising pipes on the Dia Met/BHP property leads commentators to speculate that the joint venture will produce diamonds for many decades. However, the economic

2 Canadian dollars

viability of Pipes 3 and 4 will not be firmly established before the 1994 bulk sampling program is complete. During 1994, BHP, the joint venture operator, will also bulk sample a third pipe, the promising Panda pipe located 1.2 km northeast of Pipe 4 (Koala). The results for three bulk-sampled pipes should be known by the fall of 1994. If the results are positive, BHP will prepare a full-scale feasibility study to be completed by year's end.

BHP has indicated that they could have a mine in production in 1997 if mine feasibility results are positive. Currently, BHP envisages a development sequence that involves Pipes 4 (Koala), 3 (Fox), 1 (Leslie) and Panda, all located within a linear distance of 10 km. It is expected that the Koala and Panda open pit mines will provide the initial mill feed and these will be followed by production from the Fox and Leslie open pit mines to reach a plant throughput of 18 000 t per day. All mill and diamond recovery processing will take place at a central facility. Over the 20 year-life of the project, almost 120 million t of ore will be processed.

The joint venture of Kennecott Canada Inc., a wholly-owned subsidiary of the world's largest mining company, RTZ Corp. PLC of the United Kingdom, and a number of junior mining companies have identified 39 pipes in the Lac de Gras area under five separate joint venture agreements. Kennecott et al have identified a promising pipe (the Tli Kwi Cho pipe or DO-27) on DHK Resources' WO claim block, 35 km to the southeast of the Dia Met/BHP property (Map 4). Under Kennecott's larger than \$10-million³ exploration program, a diamond recovery plant was constructed at the Con mine in Yellowknife. Underground sampling of 5 000 t of kimberlite and processing of the material is in progress. Kennecott will undoubtedly proceed with a mine feasibility study if the sampling results are favourable and it could proceed with bulk sampling of the DO-18 pipe, which adjoins the DO-27 pipe.

Other companies including Monopros Limited, a subsidiary of De Beers Consolidated Mines Ltd; the joint venture of Mill City Gold Mining Corp., Tanqueray Resources Ltd. and Fibre-Klad Industries Ltd.; and Lytton Minerals Ltd., all on properties located near the Dia Met/BHP property, are proceeding with exploration of their identified kimberlite pipes. Other companies have located pipes in the Snare Lake/Humpty Lake area and the Cross Lake area, 100 km west and 115 km southwest of Lac de Gras respectively.

In the spring of 1994, the Mill City/Tanqueray/Fibre-Klad joint venture plans to commence a bulk sample of the promising Torrie Pipe, near Yamba Lake, located a few kilometres north of the Dia Met/BHP property. A large-diameter drill from lake ice locations will retrieve a minimum 25 t sample for diamond recovery. Lytton Minerals tested a 29.45 t sample from its Ranch Lake pipe that yielded 5.38 carats. Additional targets will be drill identified by companies as the Lac de Gras regional exploration play proceeds.

Socio-economic Considerations

From a public perspective, the socio-economic benefits that may be derived as a result of the successful development of a mine is a major consideration in realizing sustainable development. This is especially important in a region such as the Northwest Territories where the local people have for many generations used the land to conduct traditional pursuits. With the economy in transition, the local people continue to experience high unemployment and limited economic opportunities. Accordingly, the Dia Met/BHP

3 Canadian dollars

project, as the most advanced diamond project in the Northwest Territories, will be regarded closely for its potential to create opportunities of long-term benefit to both the local people and the company.

BHP, as the operator of the proposed development, has submitted a project proposal to the Regional Environmental Review Committee in Yellowknife. The project plan involves four diamondiferous pipes located within a few kilometres of each other, north of Lac de Gras. Over the 20-year life of the mine project, nearly 120 million t of ore will be processed. Assuming, prior to the current bulk sampling results, a speculative value range of \$60 to \$100 a tonne is ascribed to the ore, the gross value of production over the 20-year period would be \$7.2 billion to \$12 billion. A more conservative range could be based on Canadian dollars rather than U.S. dollars. The average value, when defined, could be more favourable or less favourable than these estimated values.

If a positive go-ahead decision is made, BHP hopes to be mining diamonds by early 1997. The development will require about 1 000 workers to develop the mine and processing plant over a two-year period. After production begins, it will require 650 workers with about 400 on site at any one time, over the estimated 20-year life of the mine. This plan is predicated on positive bulk sampling results during 1994 to establish the value of the prospective ore and by extension, the economic viability of the pipes.

Negotiations are planned for an Impact and Benefits Agreement between the Dogrib First Nation and BHP. The company intends to seek qualified First Nations personnel for employment and training should the project proceed to development as planned. In addition, there is the possibility that any agreement could include service contracts and the opportunity for joint ventures.

BHP states that positive socio-economic benefits will be realized in Yellowknife, the closest major centre, which will constitute an important source of supplies and equipment. In its project proposal, BHP indicates that it plans to use Yellowknife as its point of hire and pick-up. If this occurs, there will be a substantial increase in housing and service demands in Yellowknife, with the attendant economic benefits. The use of Yellowknife as a bedroom community for the development will result in increased local and territorial taxation revenues. The company has stated publicly that it will try to hire locally and use local supply services.

In order to develop a relationship of trust with the local Dene people, BHP has communicated extensively with them and will continue its liaison with the Dene as exploration proceeds. To date, its communications efforts have included: hosting on-site visits, attending community meetings and flying Dene leaders to visit its coal mine operations on Navajo lands in New Mexico.

Most properties in the Lac de Gras region are still in the early exploration stage. There remains considerable potential for other pipes that have not been drilled or bulk sampled.

**Table 9: Mines and Mining Exploration Properties,
Yukon, 1993**

Location	Area/Property/CLAIM(S)	Company	Commodity
1	Indian River	Placer mining area	Placer Au
2	Klondike	Placer mining area	Placer Au
3	Sixty Mile and Forty Mile Rivers	Placer mining area	Placer Au
4	Lower Stewart River	Placer mining area	Placer Au
4	LONESTAR	Kennecott	Au
4	CLARA	Pacific Mariner, Wealth	Au
4	KEY	Richlode Investments	Au
5	Mayo	Placer mining area	Placer Au
6	Clear Creek	Placer mining area	Placer Au
7	Dawson Range	Placer mining area	Placer Au
8	Livingstone Creek	Placer mining area	Placer Au
9	Dawson Project	Arbor Resources	Au
10	BREWERY CREEK	Loki, Hemlo Gold	Au
11	JOSEPHINE	Ivanhoe Goldfields	Au
11	NEW	Western Keltic	Cu, U, Co
12	DUBLIN GULCH	Ivanhoe Goldfields	Au
13	NEWRY	Yukon Revenue	Au
14	MOOSEHORN	G. Hartley, G. Almberg	Au, Ag
15	ARN, TAYLOR	Mendocino Resources	Au
16	GOULTER	Aurchem Resources	Au, Ag
16	LAFORMA	Rendell Mining	Au
16	MOUNT NANSEN	Gestion S.R.C.	Au
16	ANT	Richlode Investments	Au
17	GREW CREEK	YGC Resources	Au, Ag
18	TAY-LP	Pacific Comox	Au
19	WHYTE	Mountain Province	Au, Ag
19	Ketza River	YGC Resources	Au, Ag
19	KETZA	Hemlo Gold	Au
20	LOON	Cash Resources	Au, Cu
21	DECOELI	Graham Davidson	Au, Cu, Ni
22	ROB	Adda Minerals	Au, Ag, Pb
23	ROOTS, BIG THING	Feather Gold, Amcorp	Au, Ag
23	DAWSON	Cash Resources	Au, Cu
24	LOGTUNG	NDU Resources	Au, W, Mo
25	CANALASK	Expatriate Resources	Ni, Cu
25	AZ	Noranda	Cu, Au
26	KOFFEE	Eastfield, Rockwealth	Cu
26	MAYA, NICE	Eastfield, Achievers	Cu

**Table 9: Mines and Mining Exploration Properties,
Yukon, 1993 (Continued)**

Location	Area/Property/CLAIM(S)	Company	Commodity
26	ANA	Eastfield, Breckenridge	Cu
26	AZTEC	Eastfield, Canadian Comstock	Cu
27	CASINO	Pacific Sentinel	Cu, Au, Mo
28	MINTO, DEF	Minto Explorations	Cu, Au, Ag
29	WILLIAMS CREEK	Western Copper	Cu, Au, Mo
29	GRANITE MOUNTAIN	Pintail Resources	Cu, Au
30	CASH, NITRO	Patriate Resources	Cu, Mo, Au
31	IGOR et al	Pamicon, Equity et al	Cu, Au, U
31	Wernecke Mountains	Internat. Prism et al	Cu, U, Au
32	HART RIVER	Inco	Pb, Cu, Au
33	CLEAR LAKE	Mitsui Kinzoku	Pb, Zn
34	DROMEDARY	Dromedary Minerals	Zn, Pb
35	FIN	Cominco	Zn, Pb, Ag
36	DAN	Cominco	Zn
37	TENNEY	Silver Sabre	Pb, Zn, Ag
38	Division Mountain	Cash Resources	Coal
39	MEL	International Barytex	Zn, Pb, Ba
40	BARB	International Barytex	Zn, Pb
41	KENO HILL	United Keno Hill Mines	Ag, Pb
42	KOR	Teryl Resources	Diamonds
a	FARO Mines	Curragh	Zn, Pb, Ag
b	SA DENA HES Mine	Teck, Cominco	Zn, Pb
c	KING ARCTIC Jade Mine	Yukon Jade (Max Rosequist)	Jade

Commodities - Ag - silver, Au - gold, Ba - barite, Co - cobalt, Cu - copper, Mo - molybdenum,
Ni - nickel, Pb - lead, U - uranium, W - tungsten, Zn - zinc.

**Table 10: Mines and Mining Exploration Properties,
Northwest Territories, 1993**

Location	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company	Commodity
1	QUITO, KAMIK, AMAROK	BHP Minerals	Au
2	BOSTON, CHICAGO	BHP Minerals	Au
2	SY	Southern Copper	Au, Diamonds
3	LACH	Cogema Resources	Au
4	ANIALIK	Metall Mining	Au, Cu
5	TLP, P.P. 1285	BHP Minerals	Au
6	ULU, PULSE, KINDLE	BHP Minerals	Au
7	NUNA	BHP Minerals	Au
8	BUTTERFLY	Echo Bay	Au
8	BARB MINER CAP	Echo Bay	Au
8	OP, MUD	Echo Bay	Au
9	BRAU	Back River Joint Venture	Au
9	Beechey Lake	Kalahari, Lumina Resources	Au
10	EL TESORO, DULCE	BHP Minerals	Au
10	Shamrock Lake	Winspear, Apex et al	Diamonds
11	COLOMAC MINE	Royal Oak	Au, Ag
12	INCA, INDIN, LEX	Etruscan Enterprises	Au
12	NORTH INCA, LEXINDIN	Globaltex Industries	Au
12	Damoti Lake	Athabaska Gold	Au
12	TAIGA, TUTGIK, HELA	BHP Minerals	Au
13	BONE	Dave Smith	Au
14	Sito Lake, Clan Lake	Tremingo, DRW Consult.	Au
15	CHEW, DICK, ANNA	Home Ventures	Au
16	BRIAN	Nebex Resources	Au
17	CARO	Fortune Minerals	Au, Cu
18	FD, Salkeld Lake	Fortune Minerals	Au, Ag, Cu
19	Sandybeach Lake	Noranda Exploration	Au
20	SPI	Placer Dome	Au
21	NAT, Meliadine Lake	Cumberland, Comaplex	Au
22	P.P. 1332-1333	R.A. Olson	Au
23	P.P. 1330-1331	R.A. Olson	Au
24	P.P. 1334	R.A. Olson	Au
25	P.P. 1308-1311	Rhonda Mining	Pb, Zn
26	Abbott River	Cominco	Pb, Zn
27	Judge Daly Promontory	Cominco	Pb, Zn
28	P.P. 1405-1418	Cominco	Pb, Zn
29	P.P. 1252-1263	Aber Resources	Cu, Zn
30	P.P. 1300-03, 1419-20, 1435-45	Aber Resources	Cu, Ni, PGM

**Table 10: Mines and Mining Exploration Properties,
Northwest Territories, 1993 (Continued)**

Location	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company	Commodity
31	Prairie Creek	San Andreas Resources	Zn, Pb, Ag
32	MAG	MH Resources	Zn, Cu, Au
33	CYGNET, ROMA	BHP Minerals	Au
33	MONA	Metall Mining	Au
33	HIGH LAKE	Aber Resources	Cu, Zn
34	Inulik Lake	Noranda, Rhonda Mining	Cu, Zn
35	HOOD RIVER	Metall Mining	Zn, Cu
35	86 H	Lytton, New Indigo Resources	Diamonds
36	IZOK LAKE	Metall Mining	Zn, Cu
36	SKI	Echo Bay	Au
36	THOM, POINT	Gitennes Exploration	Zn, Diamonds
37	GONDOR	Metall Mining	Zn, Pb
38	HACKETT RIVER	Etruscan, Cominco	Zn, Pb, Ag
39	P.P. 1264, Judge Sissons Lake	Cogema Resources	U
40	P.P. 1398-1404	Cameco	U
41	P.P. 1455-1458	Cameco	U
42	Mountain Diatreme	Sway Resources	Diamonds
43	Lac Grandin	Jonpol Resources	Diamonds
44	Lac la Martre	Aur Resources	Diamonds
44	Lac la Martre	MJ Joint Venture	Diamonds
45	86 P, Kikerk Lake	Monopros	Diamonds
45	Coppermine	Caledonia Mining	Diamonds
46	DUB, Outlet Bay	Leeward, Skeena, Connecticut	Diamonds
47	AC	Gitennes Exploration	Diamonds
48	ICE	Leeward, Melinga, Westmin	Diamonds
49	P.P. 1348-58, 1458	Leeward, Melinga, Westmin	Diamonds
50	LUK	Cumberland, Major General, Gerle	Diamonds
51	Gibson Lake	Cumberland, Comaplex	Diamonds
52	Somerset Island	Cyclone, Breckenridge et al	Diamonds
53	Brodeur Peninsula	Lumina Investment	Diamonds
54	Bathurst Island	Cyclone Capital	Diamonds
55	Tree River	Caledonia Mining	Diamonds
56	76 K, 76 L, 86 I	Lytton, New Indigo Resources	Diamonds
57	Bathurst Inlet	Caledonia Mining	Diamonds
58	Hackett River	Etruscan Resources, Cominco	Diamonds
59	Contwoyto Lake	Layfield, Kingswood, Monument	Diamonds
60	76 F	Lytton, Kestral, Golden Lake	Diamonds

**Table 10: Mines and Mining Exploration Properties,
Northwest Territories, 1993 (Continued)**

Location	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company	Commodity
61	86 H	Monopros	Diamonds
62	86 H	Lytton, Texas Star	Diamonds
63	76 E, 86 H	Lytton, Texas Star	Diamonds
64	Beechey Lake	Coast Diamond Ventures	Diamonds
65	Back River	Gerle Gold, Echo Bay	Diamonds
66	Humpy North	Tyler Resources, Jerez Investment	Diamonds
67	Point Lake	Garden Lake, RKJ Expl., Aaron Oil	Diamonds
68	76 D, E, 86 A, H	Lytton Minerals	Diamonds
69	Torrie Pipe, Yamba Lake	Tanqueray, Fibre-Klad, Mill City	Diamonds
70	Humpy Lake	Layfield, Monument, Greater Toscana	Diamonds
71	HUMPY 1, 2	Pure Gold, Ashton et al	Diamonds
72	76 D	Monopros	Diamonds
73	GH, CARAT	Tyler Resources	Diamonds
74	Lac de Gras	Monopros	Diamonds
75	Diasyn Property 76 C	Kennecott	Diamonds
76	Snare Lake	Winspear, Int. Vestor	Diamonds
76	DICK 1	Pure Gold, Ashton et al	Diamonds
77	Humpy Lake	Lytton Minerals, Texas Star	Diamonds
78	Lake Providence	Winspear, Int. Vestor	Diamonds
79	Lac de Gras	BHP Minerals, Dia Met Minerals	Diamonds
80	76 C	Kennecott, SouthernEra	Diamonds
81	Aylmer Lake	Sanfred Resources, Rocky Mountain	Diamonds
82	Humpy Lake	SouthernEra	Diamonds
83	Winter Lake	Tanqueray, Golden Vessel, Kemano	Diamonds
84	Lac de Gras	Teryl, Calco Resources	Diamonds
85	DIAMIK	Aber, Kennecott et al	Diamonds
86	Aylmer Lake	Teryl, Calco Resources	Diamonds
87	RR	Pure Gold, Ashton et al	Diamonds
88	Lac de Gras	Prior, Optical, Anvil Resources	Diamonds
89	DHK	Kennecott, DHK Group	Diamonds
90	Courageous Lake	Winspear, Canso, Cons. Newgate	Diamonds
90	SALMITA	Winspear, Canso, Cons. Newgate	Diamonds
91	76 D	Kennecott, ATW Resources	Diamonds
92	WO, Tli Kwi Cho Pipe	Kennecott, DHK Group	Diamonds
93	MacKay Lake	Adex, Lucero Resources	Diamonds
94	Aylmer Lake West	Winspear, Adex Mineral	Diamonds

**Table 10: Mines and Mining Exploration Properties,
Northwest Territories, 1993 (Continued)**

Location	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company	Commodity
95	ELF, PAD, HARE	Falconbridge, Almaden Resources	Diamonds
96	Healey Lake	Geomaque Exploration	Diamonds
97	86 A, B	Monopros	Diamonds
98	Joly Lake East & West	Winspear, Layfield Resources	Diamonds
99	Jolly Lake	Garden Lake Resources	Diamonds
100	Warburton Bay	Garden Lake, RJK Exploration	Diamonds
101	PL 1-5	Calco, Tako Resources	Diamonds
102	MacKay Lake	Layfield, Monument Resources	Diamonds
103	CRYSTAL	Tyler Resources	Diamonds
104	Aylmer Lake	Barexor Minerals	Diamonds
105	GG East	Gerle Gold	Diamonds
106	Labrish Lake	Jonpol Resources	Diamonds
107	Basler Lake	Aur Resources	Diamonds
108	Pollock Lake	Aur Resources	Diamonds
109	Wheeler Lake	SouthernEra, Noble Pk, Mjr. General	Diamonds
110	CROSS	Pure Gold, Tenajon Resources	Diamonds
110	85 I, O, P	Monopros	Diamonds
111	Rose Lake	Pure Gold, Int. Northair, Camnor	Diamonds
112	Camsell Lake	Winspear, Commonwealth et al	Diamonds
113	MacKay Lake	Kennecott	Diamonds
114	CJ	Mountain Province	Diamonds
115	GEM	Tyler Resources	Diamonds
116	Lac de Charloit	Riley, ITL Capital, Canamera	Diamonds
117	DEB	Tyler Resources	Diamonds
118	MacKay Lake	SouthernEra, Noble Pk, Mjr. General	Diamonds
119	AK	Mountain Province	Diamonds
120	Clinton-Colden Lake	SouthernEra, Noble Pk, Mjr. General	Diamonds
121	Clinton-Colden Lake	Teryl, Calco, Major General	Diamonds
122	Doyle Lake	Gerle Gold, Teck/Cominco	Diamonds
123	Artillery Lake	SouthernEra, Noble Pk, Mjr. General	Diamonds
124	Clinton-Colden Lake	Teryl, Calco, Major General	Diamonds
125	Clinton-Colden Lake	Gerle Gold, Teck/Cominco	Diamonds
125	GG East	Gerle Gold	Diamonds

**Table 10: Mines and Mining Exploration Properties,
Northwest Territories, 1993 (Continued)**

Location	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company	Commodity
126	Nicholas Lake	Athabaska Gold	Au
a	POLARIS MINE	Cominco	Zn, Pb
b	NANISIVIK MINE	Nanisivik Mines	Zn, Pb, Ag
c	LUPIN MINE	Echo Bay Mines	Au
d	CON MINE	Miramar	Au
d	MARLIN, MIRAGE, SLAVE	Royal Oak Mines	Au
e	GIANT MINE	Royal Oak Mines	Au
e	Walsh Lake	Nebex Resources	Au
e	Northbelt	Nebex Resources	Au
f	PTARMIGAN and TOM MINES	Tremarco Resources	Au
g	MON MINE	Ger-Mac Contracting	Au

Commodities - Ag - silver, Au - gold, Co - cobalt, Cu - copper, Mo - molybdenum, Ni - nickel,
Pb - lead, PGM - platinum group metals, U - uranium, W - tungsten, Zn - zinc.

TABLE 11: MINERAL PRODUCTION, YUKON, 1984 - 1993

MINERAL		1984	1985	1986	1987	1988	1989	1990	1991	1992(R)	1993(P)
Gold	\$ kg	44 419 000 2 960	42 669 000 3 065	58 237 000 3 547	88 970 000 4 674	87 386 000 5 052	80 070 000 5 652	66 731 000 4 639	51 573 000 3 865	49 898 000 3 737	50 426 000 3 407
Silver	\$ kg	18 825 000 54 000	13 098 000 47 000	18 468 000 73 000	40 965 000 133 000	42 593 000 159 000	14 851 000 71 000	15 177 000 84 000	12 890 000 87 000	19 014 000 124 000	5 027 000 29 000
Lead	\$ kg	1 539 000 2 083 000	848 000 1 470 000	23 893 000 135 091 000	105 982 000 100 267 000	118 696 000 117 058 000	98 310 000 94 529 000	124 704 000 104 181 000	79 825 000 93 912 000	99 595 000 135 688 000	13 908 000 27 112 000
Copper	\$ kg		19 000 10 000	13 000 6 000	22 000 9 000						
Zinc	\$ kg	244 000 173 000	137 000 109 000	61 521 000 50 634 000	187 336 000 147 045 000	237 932 000 143 939 000	332 934 000 154 709 000	325 366 000 168 846 000	191 194 000 149 487 000	303 051 000 202 304 000	41 738 000 33 906 000
Antimony	\$ kg						11 000 4 000	3 000 1 000	2 000 1 000		
Bismuth	\$ kg	2 000 162	11 000 1 000	5 000 541	2 000 X	2 000 X	12 000 1 000		2 000 N/A		
Cadmium	\$ kg	9 000 2 000	5 000 1 000	8 000 2 000	13 000 2 000	62 000 3 000	8 000 1 000		N/A N/A		
Sand and Gravel	\$ t	5 105 000 3 074 000	2 995 000 1 185 000	13 355 000 4 902 000	1 502 000 352 000	5 184 000 2 246 000	5 675 000 2 367 000	9 833 000 2 113 000	5 214 000 1 441 000	6 446 000 2 318 000	6 261 000 2 236 000
Sulphur (smelter gas)	\$ t		267 000 2 000	1 000 7	156 000 1 000	183 000 2 000	39 000 N/A		3 000 N/A		
Coal (E)	\$ t			209 000 17 223	440 000 20 000	100 000 10 000	420 000 40 000			142 000 14 000	
Stone	\$ t				679 000 206 000						
TOTAL	\$	70 143 000	60 069 000	176 310 000	426 027 000	492 299 000	532 330 000	541 814 000	340 703 000	478 147 000	117 361 000

Source: Mining Sector, Natural Resources Canada and Natural Resources and Environment Branch, Indian Affairs and Northern Development.
(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential, (N/A) Not available.

TABLE 12: MINERAL PRODUCTION, NORTHWEST TERRITORIES, 1984-1993

MINERAL	1984	1985	1986	1987	1988	1989	1990	1991	1992(R)	1993(P)	
Gold	\$ kg	191 071 000 12 713	177 079 000 12 713	205 266 000 12 503	223 456 000 11 740	205 503 000 11 880	177 260 000 12 208	223 788 000 15 557	222 504 000 16 752	180 501 000 13 518	192 630 000 13 016
Silver	\$ kg	20 361 000 59 000	9 083 000 33 000	5 478 000 22 000	4 006 000 13 000	6 923 000 26 000	3 820 000 18 000	3 457 000 19 000	2 524 000 17 000	2 397 000 16 000	1 855 000 11 000
Copper	\$ kg	130 000 69 000	46 000 23 000	1 000 1 000	4 000 2 000	3 000 1 000					
Lead	\$ kg	66 647 000 90 198 000	44 489 000 77 083 000	91 129 000 133 836 000	139 370 000 131 744 000	52 223 000 51 502 000	41 323 000 39 734 000	55 766 000 46 588 000	30 080 000 35 388 000	28 729 000 39 141 000	14 833 000 28 914 000
Zinc	\$ kg	386 813 000 274 920 000	356 415 000 284 223 000	322 064 000 265 073 000	328 781 000 258 070 000	537 756 000 325 321 000	708 009 000 329 001 000	420 550 000 218 241 000	221 464 000 173 154 000	256 878 000 171 481 000	179 760 000 146 027 000
Cadmium	\$ kg	1 034 000 214 000	866 000 238 000	670 000 175 000	501 000 86 000	3 172 000 166 000	4 405 000 269 000	266 000 31 000			
Bismuth	\$ kg	34 000 3 000	60 000 3 000								
Antimony	\$ kg				141 000 44 000	55 000 19 000	43 000 18 000	6 000 3 000			
Tungsten Trioxide (E)	\$ kg	33 584 000 3 112 000	38 918 000 3 529 000	17 363 000 2 470 000							
Arsenious Trioxide (E)	\$ kg	5 837 000 4 684	1 969 000 4 098	254 000 406	666 000 X	2 366 000 X	1 286 000 X	240 000 X			
Sulphur (smelter gas)	\$ kg		11 665 000 98 000	21 788 000 147 000	6 912 000 59 000	7 286 000 73 000	8 468 000 67 000	2 677 000 17 000			
Sand and Gravel	\$ kg	36 323 000 7 249 000	8 981 000 6 803 000	3 281 000 986 000	8 132 000 2 183 000	10 966 000 2 443 000	11 813 000 2 203 000	13 856 000 3 274 000	6 739 000 1 824 000	10 673 000 2 991 000	11 585 000 2 601 000
Stone	\$ kg	4 617 000 729 000	434 000 163 000	1 011 000 368 000	1 486 000 472 000	232 000 108 000	4 344 000 727 000	9 079 000 1 495 000	7 788 000 1 003 000	2 679 000 884 000	2 205 000 467 000
TOTAL	\$	746 451 000	650 005 000	668 305 000	713 455 000	826 485 000	960 771 000	729 685 000	488 099 000	481 858 000	402 868 000

Source: Mining Sector, Natural Resources Canada and Natural Resources and Environment Branch, Indian Affairs and Northern Development.
(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential, (N/A) Not available.

